



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL.

EDITED BY  
THE HONORARY SECRETARIES.



25000

JANUARY TO DECEMBER,

1879.





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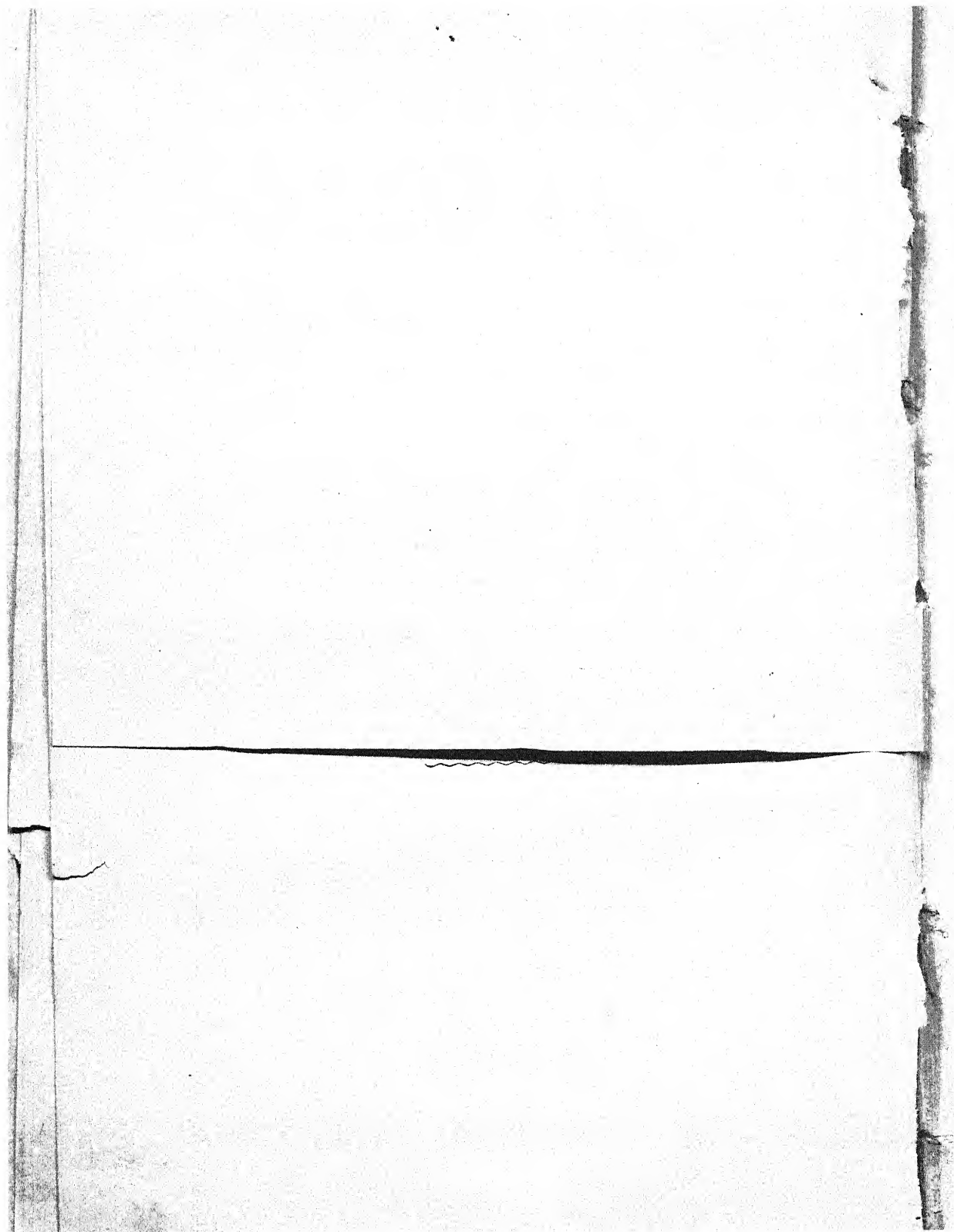
## ERRATA.

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Plate VI should be Plate V			
"	VII	"	" VI
"	VIII	"	" VII
"	IX	"	" VIII
"	X	"	" IX
"	XI	"	" X
"	XII	"	" XI

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The publication of the Annual Accounts is unavoidably postponed.  
They will probably appear as an Appendix in the April Proceedings.



## ERRATA.

### *Proceedings, August 1879.*

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Page 224 line 26 *for* Booktoff *read* Bootkoff.  
" 226 " 26 " Polkoyak " Ulkoyak.  
" 232 " 7 " Khvahni " Khvalim.

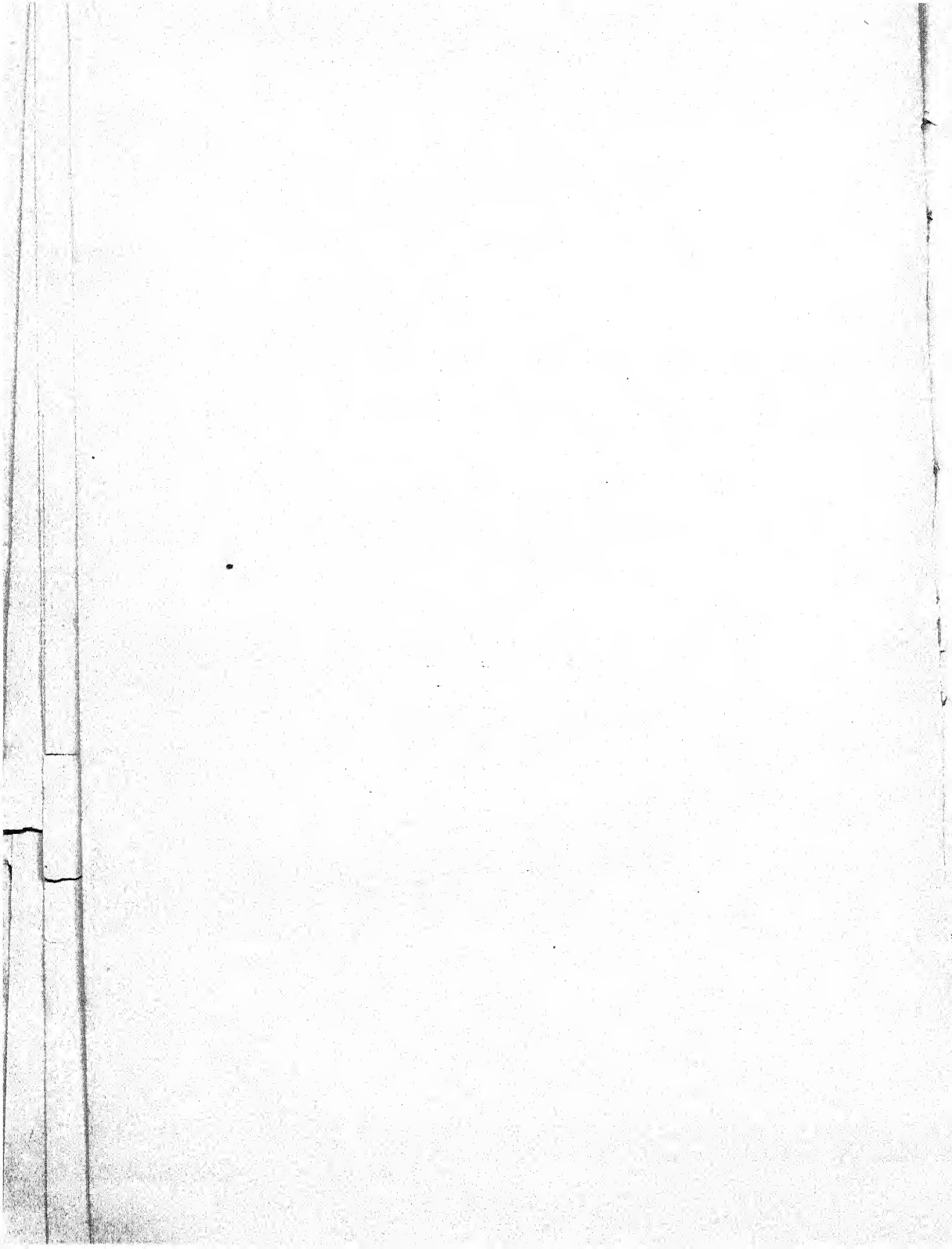
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### *Proceedings, January 1880.*

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Page 3, line 16, <i>for</i> bitumen	<i>read</i> cretaceous.
" 3, " 18, " baser	" basic.
" 3, " 31, " soon	" can.
" 3, " 33, " seems	" seem.
" 3, " 36, " come	" some.
" 3, " 36, " montitis	" marbles.
" 3, " 36, " stratitis	" steatites.
" 3, " 37, " approximately	" appropriately.
" 4, " 4, " solutions	" relations.
" 4, " 5, " contracting	" contrasting.
" 4, " 12, " Karatiza	" Karatiga
" 4, " 31, " continuously	" extensively.

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[APPENDIX.]

LIST OF MEMBERS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
ON THE 31ST DECEMBER 1878,



## LIST OF ORDINARY MEMBERS.

R. = Resident. N. R. = Non-Resident. N. S. = Non-Subscribing.  
L. M. = Life Members. F. M. = Foreign Member.

N. B.—Members who have changed their residence, since this list was drawn up, are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alterations may be made in the subsequent edition. Errors or omissions in the following list should also be communicated to the *Secretaries*.

Members who are about to leave India and do not intend to return, are particularly requested to notify to the *Secretaries*, whether it be their desire to continue as members of the Society, otherwise, in accordance with Rule 40 of the Bye-laws, their names will be removed from the list at the expiration of three years from the time of their leaving India.

Date of Election.		
1860 Dec. 5.	R.	Abdul-Latif, Khán Bahádur, Maulawí. <i>Calcutta.</i>
1868 Sept. 2.	N.S.	Adam, R. M. <i>Europe.</i>
1878 Mar. 6.	R.	Adharlal Sen, B. A., Babu. <i>Calcutta.</i>
1860 July 4.	N.R.	Ahmad Khán Bahádur, Sayyid, c. s. i. <i>Benares.</i>
1872 April 3.	N.R.	Ahsan-ullah, Nawáb. <i>Dacca.</i>
1860 April 4.	N.R.	Aitchison, J. E. T., M. D., Surgeon-Major, 29th N. I. <i>Talagong.</i>
1871 June 7.	N.R.	Alexander, J. W. Ajmere College. <i>Ajmere, Rajpootana.</i>
1878 Mar. 6.	N.R.	Allen, G. W., c. i. e., <i>Pioneer Press, Allahabad.</i>
1860 Oct. 3.	R.	Amír Ali, Khán Bahádur, Nawáb. <i>Calcutta.</i>
1874 June 3.	R.	Amír Ali, Sayyid, Barrister at Law. <i>Calcutta.</i>
1865 Jan. 11.	R.	Anderson, John, M. D., F. L. S., Superintendent, Indian Museum. <i>Calcutta.</i>
1878 Aug. 29.	R.	Anthony, A. H., Financial Department. <i>Calcutta.</i>
1875 June 2.	R.	Apcar, J. G., Barrister at Law. <i>Calcutta.</i>
1875 Feb. 3.	N.R.	Armstrong, J., Surgeon, Beng. Army. Marine Survey Department.
1877 June 6.	R.	Arnold, Henry Kerchever Walter, Offg. Asst. Secretary, Indian Museum. <i>Calcutta.</i>
1877 July 4.	R.	Ashgar Ali Khan, Nawáb Diler Jang Bahádur, c. s. i., <i>Calcutta.</i>
1871 Sept. 6.	N.R.	Atkinson, Edwin Felix Thomas, B. A., c. s., Offg. Acet. General, N. W. P. <i>Allahabad.</i>
1869 Feb. 3.	N.R.	Attar Singh Bahádur, Sirdár, M. U. F., Chief of Bhadour. <i>Ludiana.</i>
1870 Feb. 2.	N.R.	Baden-Powell, Baden Henry, c. s., Conservator of Forests. <i>Lahore.</i>
1873 Aug. 6.	N.R.	Badgley, Major William Francis, s. c., Offg. Deputy Superintendent of Surveys. <i>Shillong.</i>

Date of Election.		
1862 Feb. 5.	R.	Baisák, Gaurdás, Bábu, Depy. Magistrate. <i>Seram-pur.</i>
1865 Nov. 7.	F.M.	Ball, Valentine, M. A., F. G. S., Geol. Survey of India. <i>Geological Survey Office. Europe.</i>
1860 Nov. 1.	R.	Banerjea, Rev. Kristno Mohun, LL. D. <i>Calcutta.</i>
1876 June 7.	R.	Baness, John Frederick, Chief Draftsman, Surveyor General's Office. <i>Calcutta.</i>
1878 July 3.	N.R.	Barbe, H. L. St., c. s. <i>Bhamo Residency.</i>
1869 Dec. 1.	N.R.	Barker, R. A., M. A., Civil Surgeon. <i>Bogra.</i>
1860 July 4.	R.	Batten, George Henry Maxwell, c. s., Barrister at Law, Famine Commissioner. <i>Calcutta.</i>
1859 May 4.	L.M.	Bayley, Edward Clive, The Hon. Sir, B. C. S., K. C. S. I., C. I. E. <i>Europe.</i>
1878 June 5.	N.R.	Bayley, C. S., c. s. <i>Jessore.</i>
1873 Feb. 5.	R.	Bayne, R. R., M. B. I. B. A., Draughtsman, Chief Engineer's Office, E. I. Railway. <i>Calcutta.</i>
1864 Sept. 7.	N.R.	Beames, John, B. C. S., Magistrate and Collector. <i>Chittagong.</i>
1841 April 7.	L.M.	Beaufort, F. L., B. C. S., (retired). 62, <i>Montague Square, Hyde Park, London.</i>
1878 Sept. 25.	N.R.	Beighton, T. D., c. s., Joint Magistrate. <i>Balasore.</i>
1862 Oct. 8.	R.	Bernard, Charles Edward, c. s., Secy. to the Govt. of India, Home Department. <i>Calcutta.</i>
1872 Aug. 7.	R.	Beverley, Henry, M. A., c. s., Offg. District and Sessions Judge, 24-Pergunnahs. <i>Calcutta.</i>
1876 Nov. 15.	N.R.	Beveridge, Henry, c. s., District and Sessions Judge, <i>Rangpur.</i>
1875 July 7.	N.R.	Black, F. C., Asst. Engineer. <i>Hamirpur, N. W. P.</i>
1873 Dec. 3.	R.	Blackburn, J., Manager, Oriental Gas Company, <i>Calcutta.</i>
1857 Mar. 4.	L.M.	Blanford, H. F., A. R. S. M., F. G. S., Meteorological Reporter, Govt. of India. <i>Europe.</i>
1859 Aug. 3.	R.	Blanford, W. T., A. R. S. M., F. R. S., F. G. S., Depy. Supdt. Geological Survey of India. <i>Geological Survey Office. Calcutta.</i>
1873 April 2.	N.R.	Blissett, T., Superintendent Telegraph Stores. <i>Nagpur.</i>
1877 May 2.	R.	Bourdillon, James Austin, c. s., Offg. Inspector General of Registration. <i>Calcutta.</i>
1876 Nov. 15.	N.S.	Bowie, Major M. M. <i>Europe.</i>
1868 Jan. 15.	N.R.	Boxwell, John, c. s., Offg. Deputy Commissioner. <i>Dumka, Sonthal Pergunnahs.</i>
1876 May 4.	N.R.	Bradshaw, A. F., Surgeon Major, Surgeon to the Commander-in-Chief. <i>Simla.</i>
1860 Mar. 7.	R.	Brandis, Dietrich, PH. D., Inspector General of Forests. <i>Calcutta.</i>
1872 June 5.	R.	Brooks, W. E., c. E., Supdg. Engineer, E. I. Railway. <i>Howrah.</i>
1871 Jan. 4.	R.	Brough, R. S., Offg. Electrician, Telegraph Store Department. <i>Calcutta.</i>

Date of Election.		
1866 Nov. 7.	N.R.	Browne, Col. Horace Albert, Commissioner of Pegu. <i>Rangoon.</i>
1871 Sept. 6.	N.R.	Buckle, H., Deputy Commissioner. <i>Toungthoo, Burmah.</i>
1869 Jan. 20.	N.R.	Cadell, Alan, B. A., c. s., Settlement Officer. <i>Banda.</i>
1873 Mar. 5.	R.	Cappel, A. J. L., Depy. Director General of Telegraphs. <i>Calcutta.</i>
1876 Nov. 15.	R.	Cayley, Surgeon-Major H., Surgeon, Mayo Native Hospital. <i>Calcutta.</i>
1875 April 4.	R.	Chambers, Dr. E. W. <i>Calcutta.</i>
1861 Mar. 1.	N.R.	Chaudhuri, Harachandra Bábu, Zamindar. <i>Sherpur, Maimansingh.</i>
1874 Aug. 5.	N.S.	Chennell, A. W., Asst. Surveyor, Survey Dept. <i>Europe.</i>
1868 Feb. 5.	N.R.	Clark, Lieut.-Col. Edgar Gibson, s. c., Asst. Commissioner. <i>Kheri, Oudh.</i>
1877 Aug. 30.	R.	Clarke, Capt. Henry Wilberforce, R. E., Depy. Consulting Engr., Govt. of India, for Guaranteed Railways. <i>Calcutta.</i>
1878 Feb. 6.	R.	Clarke, Colonel the Hon'ble Sir A., R. E., K. C. M. G., C. B. C. I. E. <i>Calcutta.</i>
1878 Mar. 6.	R.	Cockerell, The Hon'ble H. A. <i>Calcutta.</i>
1877 Mar. 7.	R.	Colvin, The Hon. Bazett Wetenhall, c. s., Member of the Governor-General's Council. <i>Calcutta.</i>
1874 Nov. 4.	N.R.	Constable, Archibald, Asst. Engineer, Railway Dept. <i>Lucknow.</i>
1876 Mar. 1.	R.	Crawford, James, B. A., c. s., Barrister at Law, Registrar, High Court. <i>Calcutta.</i>
1877 June 6.	R.	Croft, A. W., M. A., Offg. Director of Public Instruction. <i>Calcutta.</i>
1874 Mar. 4.	N.R.	Crombie, Alexander, M. D., Civil Surgeon. <i>Dacca.</i>
1877 Feb. 7.	N.R.	Crooke, William, c. s., Offg. Joint Magistrate. <i>Gorakhpur.</i>
1873 Aug. 6.	R.	Cunningham, David Douglas, M. B., Special Asst. to the Sanitary Commissioner with the Govt. of India. <i>Calcutta.</i>
1847 June 2.	F.M.	Dalton, Major-General Edward Tuite, c. s. i., s. c. (retired). <i>Europe (care of Messrs. Gillanders, Arbuthnot and Co., Calcutta.)</i>
1870 May 4.	N.R.	Damant, Guybon Henry, c. s., Political Officer in charge, Naga Hills. <i>Samaguting.</i>
1873 Dec. 3.	N.R.	Dames, Mansel Longworth, c. s., Asst. Commissioner. <i>Dera Ghazi Khan.</i>
1865 June 7.	N.R.	Dás, Jaykissen, Bahádúr, Rájá, c. s. i. <i>Moradabad.</i>
1871 June 7.	R.	Dás, Rámkrishna, Bábu. <i>Calcutta.</i>
1869 April 7.	F.M.	Day, Dr. Francis, F. L. S., F. Z. S. <i>Europe.</i>
1856 June 4.	N.S.	DeBourbel, Lieut.-Col. Raoul, R. E. <i>Europe.</i>
1872 Aug. 7.	R.	Dejoux, P., Executive Engineer, P. W. D. <i>Calcutta.</i>

Date of Election.		
1869 Oct. 6.	N.R.	Delmerick, J. G., Extra Asst. Commissioner. <i>Delhi.</i>
1873 Jan. 8.	N.R.	Dennys, H. L., Dist. Supdt. of Police. <i>Sambalpur, C.P.</i>
1862 May 7.	N.R.	Dhanapati Singh Dughar, Raí Bahádur. <i>Azinganj.</i>
1853 Sept. 7.	N.S.	Dickens, Major-General Craven Hildesley, R. A., C. S. I., <i>Europe.</i>
1870 May 4.	F.M.	Dobson, G. E., B. A., M. B., F. L. S., <i>Royal Victoria Hospital. Netley. Southampton.</i>
1875 Mar. 3.	N.R.	Dodgson, Walter. <i>Rangpur.</i>
1878 May 2.	R.	Donaldson, P. <i>Calcutta.</i>
1875 Mar. 3.	R.	Douglas, J., Offg. Supdt. of Telegraphs. <i>Calcutta.</i>
1867 June 5.	N.R.	Duthoit, William, c. s., Magistrate and Collector. <i>Shahjahanpur. N. W. P.</i>
1873 Aug. 6.	R.	Dutt, Jogesh Chunder, Bábu. <i>Calcutta.</i>
1877 Aug. 30.	N.R.	Dutt, Kedarnath, Bábu, Depy. Magistrate. <i>Bogra.</i>
1869 June 2.	N.R.	Dutt, Udaychand, Bábu. <i>Faridpur.</i>
1873 April 2.	R.	Dutt, Umesh Chunder, Bábu. <i>Calcutta.</i>
1870 Mar. 8.	L.M.	Edinburgh, H. R. H. The Duke of. <i>Europe.</i>
1863 May 6.	N.R.	Edgar, John Ware, c. s. i., c. s., Offg. Magistrate and Collector. <i>Shahabad. L. P.</i>
1874 Dec. 2.	N.R.	Egerton, The Hon. Robert Eyles, c. s., c. s. i., Lieut.-Governor of the Panjab. <i>Lahore.</i>
1871 Dec. 2.	R.	Eliot, J., M. A., Offg. Meteorological Reporter to Govt. of India. <i>Calcutta.</i>
1871 Oct. 4.	N.R.	Evezard, Col. G. E. <i>Deesa, Gujarat.</i>
1863 Oct. 7.	N.S.	Ewart, Surgeon-Major J., M. D. <i>Europe.</i>
1859 Dec. 7.	R.	Fath Alí, Maulawí. <i>Calcutta.</i>
1863 Jan. 15.	F.M.	Fedden, Francis, Asst. Geological Survey of India. <i>Geol. Survey Office. Europe.</i>
1876 Jan. 5.	R.	Feistmantel, Ottokar, M. D., Palæontologist, Geological Survey of India. <i>Calcutta.</i>
1876 July 5.	N.R.	Foulkes, The Rev. Thos., Chaplain. <i>Bangalore.</i>
1868 May 6.	N.R.	Field, Charles Dickenson, M. A., LL. D., c. s., Barrister at Law, District Sessions Judge. <i>Burdwan.</i>
1869 Sept. 1.	N.R.	Fisher, John Hadden, c. s., Depy. Commissioner. <i>Jabalpur.</i>
1872 Dec. 4.	N.R.	Forbes, Major John Greenlaw, R. E., Supdg. Engineer. N. W. P. & Oudh Irrigation Branch. <i>Lucknow.</i>
1875 Jan. 6.	N.R.	Forbes, Capt. C. J. F., F. R. g. s., Depy. Commissioner. <i>Tharrawaddy, Burma.</i>
1869 Oct. 12.	F.M.	Forlong, Lieut.-Col. J. G. R., M. S. C. 24, <i>St. James' Square, London.</i>
1869 Sept. 1.	N.R.	Fryer, Major G. E., Depy. Commissioner Thonkwa District. <i>Maobung, B. Burmah.</i>
1867 Sept. 4.	R.	Fyfe, The Rev. W. C., M. A., Principal, Free Church College. <i>Calcutta.</i>
1873 Dec. 3.	N.R.	Gamble, J. S., B. A., Asst. to Inspector General of Forests. <i>Cooch Behar.</i>

Date of Election.		
1871 Aug. 2.	N.R.	Gangaprasad, Munshi, Depy. Collector. <i>Jaunpur.</i>
1874 July. 1.	N.R.	Gardner, David Mason, c. s., Offg. Magistrate and Collector. <i>Azamgarh.</i>
1859 Aug. 3.	L.M.	Gastrell, Major-General James Eardley, (retired). <i>c/o Messrs. Coutts &amp; Co., London.</i>
1867 Dec. 4.	N.R.	Gay, E. Esq., M. A., c. s., Depy. Comptroller General. <i>Bombay.</i>
1877 Aug. 30.	R.	Ghosh, Jnanendra Chandra Bábu. <i>Calcutta.</i>
1871 May 3.	R.	Ghosh, Káliprasanna Bábu. <i>Calcutta.</i>
1877 Dec. 5.	N.R.	Ghosh, Dr. Krishna Dhava. <i>Rungpur.</i>
1869 Feb. 3.	R.	Ghosh, Pratápachandra Bábu, B. A. <i>Calcutta.</i>
1870 May 4.	R.	Ghoshál, Satyánand, Rájá. <i>Calcutta.</i>
1875 July 7.	N.S.	Girdlestone, Charles Edward Ridgway, c. s. <i>Europe.</i>
1861 Feb. 5.	F.M.	Godwin-Austen, Lieut.-Colonel H. H., F. Z. S., F. R. G. S. <i>United Service Club, St. James', London.</i>
1862 July 2.	N.R.	Gordon, Robert, c. E., Executive Engineer, P. W. D., <i>Henzada, B. Burmah.</i>
1869 July 7.	N.B.	Gordon, James Davidson, c. s., c. s. I., Offg. Chief Commissioner. <i>Mysore.</i>
1875 July 7.	N.S.	Gouldsbury, J. R. E. <i>Europe.</i>
1863 Nov. 4.	F.M.	Gowan, Major-General J. Y. <i>Woodlands, Wimbledon, London.</i>
1877 Nov. 7.	L.M.	Grant, Alexander, M. I. C. E., Director of State Railways <i>Allahabad.</i>
1866 June 6.	R.	Gribble, Thomas William, B. C. S. <i>Calcutta.</i>
1876 Nov. 15.	N.R.	Grierson, George Abraham, c. s., Offg. Joint Magistrate. <i>Madhubani, Darbhanga, Tirhut.</i>
1861 Sept. 4.	N.R.	Griffin, Lepel Henry, B. C. S., Depy. Commissioner and Offg. Secy. to the Govt. of Punjab. <i>Lahore.</i>
1878 May 2.	N.R.	Griffith, R. <i>Allahabad.</i>
1861 Feb. 6.	N.R.	Growse, Frederick Salmon, M. A., C. S., C. I. E., Joint Magistrate. <i>Bulandshahr, N. W. P.</i>
Jan. 6.	N.S.	Gunn, John Sutherland, M. B., Surgeon, 4th Bengal Cavalry. <i>Europe.</i>
1867 July 3.	N.R.	Hacket, Charles Augustus, Asst. Geol. Survey of India.
1861 Feb. 2.	N.R.	Harrison, A. S., B. A., Principal, Muir Central College. <i>Allahabad.</i>
1877 Sept. 27.	R.	Hart, J., Attorney at Law. <i>Calcutta.</i>
1875 Mar. 3.	N.R.	Hendley, Dr. Thomas Holbein, Residency Surgeon. <i>Jaipur, Rájputáná.</i>
1875 Aug. 4.	N.S.	Hewitt, James Francis Katherinus, c. s., Magistrate and Collector. <i>Europe.</i>
1872 Dec. 4.	R.	Hoernle, Rev. A. F. R., PH. D. Cathedral Mission College. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Hoey, W. <i>Unao, Oudh.</i>

Date of Election.		
1868 Nov. 4.	N.R.	Holroyd, Major William Rice Morland. Director of Public Instruction. <i>Lahore, Panjab.</i>
1873 Jan. 8.	L.M.	Houstoun, G. L., F. G. S. <i>Johnstone Castle, Renfrewshire, Scotland.</i>
1863 Jan. 15.	N.R.	Howell, Mortimer Sloper, C. S., Joint Magistrate. <i>Futihpur.</i>
1866 Feb. 7.	N.S.	Hoyle, G. W., Attorney at Law. <i>Not known.</i>
1867 Aug. 7.	N.R.	Hughes, T. H., A. R. S. M., F. G. S., Asst. Geol. Survey of India. <i>Europe.</i>
1866 Jan. 17.	N.R.	Hughes, Captain W. G., M. S. C., Depy. Commissioner, Hill Tracts. <i>Arracan.</i>
1878 Sept. 25.	N.R.	Hughes, G., C. S., Assistant Commissioner. <i>Montgomery, Panjab.</i>
1870 Jan. 5.	R.	Hume, Allan Octavian, C. B., C. S., Secy. to the Govt. of India, Dept. of Revenue, Agriculture and Commerce. <i>Calcutta.</i>
1870 June 1.	N.S.	Hunter, William Wilson, C. S., LL. D., Director General of Gazetteers to the Govt. of India. 6, <i>Grosvenor St., Edinburgh, Scotland.</i>
1868 April 1.	N.S.	Hyde, Col. Henry, R. E. <i>Europe.</i>
1872 Dec. 4.	N.R.	Ibbetson, Denzil Charles Jelf, C. S., Asst. Commissioner. <i>Karnal, Panjab.</i>
1866 Mar. 7.	N.R.	Irvine, William, C. S., Joint Magistrate. <i>Futteghar.</i>
1871 Mar. 8.	R.	Isaac, T. S., C. E., Supdg. Engineer, P. W. D., Presidency Circle. <i>Calcutta.</i>
1874 Feb. 4.	N.S.	Jackson, Surgeon Major Charles Julian. <i>Europe.</i>
1878 May. 2.	R.	Jackson, The Hon'ble L. S., Judge, High Court. <i>Calcutta.</i>
1876 July 5.	N.R.	Jarrad, Lieut. F. W., R. N., F. R. A. S., Depy. Superintendent, Marine Survey Dept. <i>Ratnagiri.</i>
1866 Feb. 7.	N.R.	Johnson, W. H., C. E., <i>Barrackpore.</i>
1862 Mar. 5.	N.R.	Johnstone, Major James William Hope, Depy. Commissioner. <i>Bannu, Panjab.</i>
1867 Dec. 4.	N.R.	Johnstone, Lieut.-Col. James, Political Agent. <i>Manipur, Assam.</i>
1878 Aug. 7.	N.R.	Johnstone, P. DeLacy, Depy. Commr. <i>Hoshiarpur.</i>
1873 Dec. 3.	N.R.	Johore, H. H., Maharaja of, K. C. S. I. <i>New Johore, Singapore.</i>
1873 April 2.	N.R.	Jones, Frederick, C. S., Magistrate and Collector. <i>Tipperah.</i>
1875 Nov. 3.	N.R.	Jones, Samuel Simpson, B. A., C. S., Offg. Asst. Commissioner in charge of Sonthal Pergunahs, <i>Rajmehal.</i>
1869 April 7.	R.	Kabiruddin Ahmad, Maulawi. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Keene, G. H., C. S. <i>Agra.</i>
1874 Dec. 2.	N.R.	Khudabakhsh Khan, Maulawi. <i>Patna.</i>



Date of Election.		
1867 Dec. 4.	R.	King, G., M. B., F. L. S., Supdt. Royal Botanical Gardens. <i>Sibpur, Calcutta.</i>
1862 Jan. 15.	N.R.	King, W., Jr., A. B., F. G. S., Depy. Supdt. for Madras, Geol. Survey of India. <i>Geol. Surv. Office.</i>
1875 Dec. 1.	R.	Knight, Hon'ble, J. B., C. I. E. <i>Calcutta.</i>
1877 Jan. 17.	N.R.	Kishor, Kumara Radha Deb, Juvraj of Hill Tipperah. <i>Tipperah.</i>
1878 Oct. 4.	R.	Krishna, Gopal, Babu. <i>Calcutta.</i>
1877 Sept. 27.	N.R.	LaTouche, James John Digges, B. A., C. S., Offg. Joint Magistrate. <i>Muttra.</i>
1878 Aug. 7.	R.	Lawrie, Dr. E., Medical College. <i>Calcutta.</i>
1870 July 6.	R.	Lethbridge, E. Roper, M. A., C. I. E. <i>Calcutta.</i>
1873 Feb. 5.	F.M.	Lewis, Timothy Richards, M. B., Special Asst. to Sanitary Commissioner with Govt. of India. <i>Europe.</i>
1864 Nov. 2.	R.	Locke, H. H., Principal, School of Art. <i>Calcutta.</i>
1866 Jan. 17.	N.R.	Low, James, Surveyor, G. T. Survey, <i>Thayetmyo. B. Burmah.</i>
1869 July 7.	N.S.	Lyall, Charles James, B. A., C. S., Under Secretary Govt. of India, Dept. of Revenue, Agriculture and Commerce. <i>Europe.</i>
1876 May 4.	R.	Lyall, John M., Messrs. Lyall, Rennie and Co. <i>Calcutta.</i>
1875 Jan. 6.	R.	Lydekker, Richard, Palæontologist, Geol. Survey of India. <i>Geological Survey Office, Calcutta.</i>
1870 April 6.	L.M.	Lyman, B. Smith. <i>Japan.</i>
1866 June 6.	N.S.	Macdonald, Lieut.-Col. J., B. S. C., Depy. Superintendent of Surveys. <i>Europe.</i>
1876 Dec. 6.	N.R.	Macdonald, J. C., Supdt. Tarai District. <i>Nynee Tal.</i>
1873 May 7.	N.R.	Mackay, W., C. E. <i>Nusseerabad.</i>
1873 Dec. 3.	R.	McLeod, Surgeon-Major Kenneth, M. D., Secretary to the Surgeon-General, Indian Medical Dept. <i>Calcutta.</i>
1848 April 5.	L.M.	MacLagan, Major-General Robert, R.E., F.R.S.E., F.R.G.S. <i>Lahore.</i>
1868 Dec. 2.	N.R.	Macauliffe, Michael, B. A., C. S., Depy. Commissioner. <i>Montgomery.</i>
1874 Jan. 7.	N.R.	Magrath, Charles Frederick, B. A., C. S., Joint Magistrate. <i>Monghyr.</i>
1877 June 6.	N.R.	Maharaja of Dharbhanga. <i>Dharbhanga.</i>
1867 April 3.	R.	Mainwaring, Lieut. Col. George Byres, S. C. <i>Serampur.</i>
1876 Dec. 6.	N.S.	Malleson, Col. G. B., C. S. I. <i>Europe.</i>
1878 April 3.	R.	Mallet, F. R., Geological Survey of India. <i>Calcutta.</i>
1864 July 6.	R.	Mallik, Devendra, Babu. <i>Calcutta.</i>
1869 Sept. 1.	R.	Mallik, Yadulal, Babu. <i>Calcutta.</i>
1872 Nov. 6.	N.R.	Man, E. H., Asst. Supdt. <i>Port Blair, Andamans.</i>
1877 Dec. 5.	N.R.	Mandelli, L. <i>Darjeeling.</i>

Date of Election.		
1869 July 7.	N.R.	Markham, Alexander Macaulay, c. s., Offg. Magistrate and Collector. <i>Allahabad.</i>
1873 July 2.	N.R.	Marshall, C. W. <i>Berhampur.</i>
1873 Aug. 6.	N.S.	Marshall, Lieut.-Col. William Elliot. <i>Europe.</i>
1877 Feb. 7.	R.	Marshall, Capt. Geo. Fred. Leicester, R. E., Offg. Asst. Secy., Govt. of India, P. W. D. <i>Calcutta.</i>
1876 Jan. 5.	N.R.	McGregor, W., Supdt. Telegraphs. <i>Dhubri, Assam.</i>
1860 Mar. 7.	R.	Medlicott, H. B., M. A., F. R. S., F. G. S., Supdt. Geological Survey of India. <i>Calcutta.</i>
1877 Mar. 7.	R.	Medlycott, Adolphus Edwin, PH. D., The Rev. <i>3, Cullen Place, Howrah.</i>
1871 Sept. 6.	N.R.	Miles, Lieut.-Colonel S. B., s. c., Political Agent. <i>Muskat.</i>
1870 July 6.	R.	Miller, A. B., B. A., Barrister at Law, Official Assignee. <i>Calcutta.</i>
1874 May 6.	N.R.	Minchin, F. J. V. <i>Aska, Ganjam.</i>
1875 Aug. 4.	N.S.	Minchin, Lieut.-Col. C. C., Political Agent and Supdt. Bahawalpur State. <i>Europe.</i>
1856 Mar. 5.	R.	Mitra, Rájendralála, Bábu, Rái Bahádúr, C. I. E., LL. D. <i>Calcutta.</i>
1876 Dec. 6.	N.R.	Mockler, Major E., Political Agent. <i>Awadur.</i>
1874 July 1.	R.	Molesworth, G. L., c. e., Consulting Engineer to Govt. of India for State Railways. <i>Calcutta.</i>
1854 Dec. 6.	R.	Morris, The Hon'ble George Gordon, B. C. S., Judge, High Court. <i>Calcutta.</i>
1878 May 2.	R.	Moyle, J. C., Barrister at Law, High Court. <i>Calcutta.</i>
1864 Nov. 2.	N.R.	Mukerjea, Bhudeva, Bábu, Inspector of Schools. <i>Ohinsurah.</i>
1854 Oct. 11.	N.S.	Muir, Sir William, K. C. S. I., B. C. S. <i>Europe.</i>
1867 Mar. 6.	R.	Mukerjea, Pearimohan, Bábu, M. A., Pleader, High Court. <i>Uttarpara.</i>
1862 July 2.	N.S.	Napier of Magdala, Baron, General, G. C. S. I., G. C. B. <i>Europe.</i>
1876 May 4.	R.	Nash, A. M., M. A., Professor, Presidency College. <i>Calcutta.</i>
1871 Jan. 4.	N.S.	Newton, Isaac. <i>Europe.</i>
1869 July 7.	N.R.	Nursing Rao, A. V. <i>Vizagapatam.</i>
1871 July 5.	N.R.	Oates, E. W., c. e., Engineer, P. W. D., Garrison Div., Sittang Canal. <i>Rangoon, Pegu.</i>
1874 Oct. 4.	R.	O'Kinealy, The Hon'ble James, c. s., District and Sessions Judge, 24-Pergannahs. <i>Calcutta.</i>
1873 Aug. 6.	N.R.	Olpherts, W. J., c. e., Resident Engr., E. I. Railway. <i>Benares.</i>
1873 Aug. 6.	R.	Parker, J. C., Custom House Agent. <i>Calcutta.</i>



Date of Election.		
1876 June 7.	R.	Parry, Robert, Professor, Presidency College. <i>Calcutta.</i>
1862 May 7.	L.M.	Partridge, Surgeon-Major Samuel Bowen, M. D. <i>Calcutta.</i>
1871 Dec. 6.	N.R.	Peal, S. E., Manager, Sapakati Tea Estate. <i>Sibságar, Assam.</i>
1873 Aug. 6.	R.	Podler, Alexander, Professor of Chemistry, Presidency College. <i>Calcutta.</i>
1864 Mar. 2.	N.R.	Pellew, Fleetwood Hugo, c. s., Offg. Commissioner. <i>Burdwan.</i>
1865 Sept. 6.	N.R.	Peppe, T. E. <i>Ranchi.</i>
1877 Aug. 1.	N.R.	Peters, C. T., M. B., Belgaum. <i>Bombay Presidency.</i>
1868 May 6.	N.R.	Peterson, F. W., Bombay Mint. <i>Bombay.</i>
1835 July 1.	F.M.	Phayre, Lieut.-G., Sir Arthur Purves, K. C. S. I., C. B. <i>Mauritius.</i>
1875 Feb. 3.	N.R.	Porter, W. J., Asst. Supdt of Police. <i>Mergui.</i>
1872 Dec. 4.	R.	Prannáth Sarasvati, Pandit, M. A., B. L. <i>Bhowanipur.</i>
1878 Feb. 6.	R.	Prinsep, the Hon'ble, H. T., Judge of the High Court. <i>Calcutta.</i>
1874 Dec. 2.	N.R.	Protheroe, Capt. M., Deputy Supdt. <i>Port Blair.</i>
1878 Aug. 29.	N.R.	Rangoon, Right Rev., Bishop of. <i>Rangoon.</i>
1877 May 2.	R.	Ravenshaw, Thomas Edw., c. s., Commissioner of Burdwan Division. <i>Calcutta.</i>
1868 April 1.	N.R.	Rái, Pramathanáth, Raja. <i>Digapati.</i>
1876 July 5.	F.M.	Raye, D. O'Connell, M. D., 1st Resdt. Surgeon, Presidency General Hospital. <i>Europe.</i>
1877 Aug. 1.	N.R.	Rees, J. C., Asst. Engr. P. W. D., Thayetmyo Division. <i>Prome, B. Burmah.</i>
1860 Mar. 7.	N.R.	Reid, Henry Stewart, c. s., Member, Board of Revenue, N. W. P. <i>Allahabad.</i>
1871 July 5.	N.S.	Reid, James Robert, c. s. <i>Europe.</i>
1872 April 3.	R.	Richards, Dr. Vincent. <i>Calcutta.</i>
1860 Jan. 3.	N.R.	Rivett-Carnac, John Henry, c. I. E., c. s., Opium Agent. <i>Ghazipur.</i>
1868 April 1.	R.	Robb, Gordon. <i>Calcutta.</i>
1863 April 1.	N.R.	Robertson, Charles, c. s., Secretary to the Govt., N. W. P. and Oude. <i>Allahabad.</i>
1878 Sept. 25.	R.	Robertson, Rev. J., Principal, Doveton College. <i>Calcutta.</i>
1865 Feb. 1.	R.	Robinson, S. H. <i>Calcutta.</i>
1876 Dec. 6.	N.S.	Rodon, Lieut. G. S., Royal Scots. <i>Europe.</i>
1870 Jan. 5.	N.R.	Ross, Major Alexander George, Staff Corps, 2nd in Comd., 1st Sikh Infy. <i>Dera Ghazi Khan, Panjab.</i>
1871 Dec. 6.	F.M.	Samuells, Major William Leycester, B. S. C. 24, Coate's Garden, <i>Edinburgh.</i>
1877 May 2.	N.R.	Sandford, W., Assistant Traffic Manager, Nizam's State Railway. <i>Secunderabad, Deccan.</i>

Date of Election.		
1878 Jan. 2.	R.	Sawyer, Capt., H. A., Military Department. <i>Calcutta.</i>
1870 May 4.	N.R.	Schlich, Dr. W. <i>Darjiling.</i>
1869 Feb. 3.	F.M.	Schwendler, L., Telegraph Store Department. <i>Europe.</i>
1876 July 5.	N.S.	Scott, Ross, c. s. <i>Europe.</i>
1874 July 1.	N.R.	Scully, Dr. John, Residency Surgeon. <i>Gilgit, Kashmir.</i>
1874 Dec. 2.	N.R.	Sen, Rám Dás, Bábu. <i>Berhampur.</i>
1876 Feb. 2.	N.R.	Shaw, R. B., Political Agent. <i>Mandalay.</i>
1878 May 2.	R.	Sharpe, C. J. <i>Calcutta.</i>
1878 April 3.	R.	Simson, A. <i>Calcutta.</i>
1876 April 5.	R.	Singh, Kumara Kantichandra. <i>Calcutta.</i>
1878 Oct. 4.	N.R.	Singh, Raja Lachman. <i>Bulandshahar.</i>
1869 Feb. 3.	N.R.	Singh, Giriprasád, Thákur. <i>Biswan Fort, Allighar.</i>
1853 Dec. 7.	N.R.	Singh, Isvariprasád, Bahádur, Rájá. <i>Benares.</i>
1859 Aug. 3.	R.	Sinha, Balaichánd, Bábu. <i>Calcutta.</i>
1877 Aug. 30.	N.R.	Singha, Pratápanaráyan, Deputy Magt. <i>Jehanabad.</i>
1867 April 3.	R.	Sirkár, Mahendralál, Dr. <i>Calcutta.</i>
1872 Aug. 7.	N.R.	Skrefsrud, Rev. L. O., India Home Mission to the Santhals. <i>Dumka, Santhal Purgunnahs.</i>
1864 Sept. 7.	N.R.	Sladen, Lieut.-Col. E. B., M. s. c., Commissioner, Arracan Division. <i>Arracan.</i>
1875 Feb. 3.	N.S.	Smidt, John. <i>Europe.</i>
1865 July 5.	R.	Smith, David Boyes, M. D., Medical College. <i>Calcutta.</i>
1874 June 3.	N.R.	Smith, Vincent Arthur, c. s., Asst. Settlement Officer. <i>Hamirpur, N. W. P.</i>
1878 Mar. 6.	R.	Souttar, W. M., Chairman of the Corporation. <i>Calcutta.</i>
1877 April 4.	N.R.	Spens, A. N. W., The Rev., Chaplain. <i>Sialkot.</i>
1872 July 3.	N.R.	Stephen, Carr, B. L., Judl. Asst. Commr. <i>Ludianah.</i>
1875 July 7.	R.	Stewart, M. G. <i>Calcutta.</i>
1876 Aug. 2.	N.R.	St. John, Major Oliver Beauchamp, R. E., Frontier Expeditionary Force. <i>Quetta Column.</i>
1861 Sept. 4.	R.	Stokes, The Hon'ble Whitley, C. S. I., C. I. E. <i>Calcutta.</i>
1869 Feb. 3.	R.	Strachey, The Hon'ble Sir J., K. C. S. I., C. I. E. <i>Calcutta.</i>
1859 Mar. 2.	N.R.	Stubbs, Lieut.-Col. Francis William, Royal Artillery. <i>Lucknow.</i>
1858 July 7.	N.R.	Sutherland, Henry Cobbe, M. A., B. C. S., Dist. and Sess. Judge. <i>Backergunge.</i>
1864 Aug. 11.	R.	Swinfløe, W., Attorney-at-Law. <i>Calcutta.</i>
1871 Mar. 1.	R.	Tagore, Dvijendranath, Bábu. <i>Calcutta.</i>
1871 Jan. 4.	R.	Tagore, Gunendranath, Bábu. <i>Calcutta.</i>
1868 June 3.	R.	Tagore, Jotendra Mohun, The Hon'ble, Maharaja. <i>Calcutta.</i>
1865 Sept. 6.	R.	Tawney, C. H., M. A., Principal, Presidency College. <i>Calcutta.</i>
1865 April 5.	N.S.	Taylor, R., c. s. <i>Europe.</i>
1874 Mar. 4.	R.	Taylor, Commander A. D., late Indian Navy. <i>Calcutta.</i>

Date of Election.		
1860 May 2.	N.R.	Temple, The Hon. Sir R., Bart., K.C.S.I., C.I.E., B.C.S. <i>Bombay.</i>
1878 June 5.	N.R.	Temple, Lieut. R. C. <i>Dharamsala.</i>
1876 Feb. 2.	R.	Tennant, Col. James Francis, R. E., F. R. S., C. I. E., Mint Master. <i>Calcutta.</i>
1875 June 2.	N.R.	Thibaut, Dr. G., Prof. Sanskrit College. <i>Benares.</i>
1869 Oct. 6.	N.R.	Thomson, A., Inspector of Schools. <i>Fuzabad.</i>
1875 Nov. 3.	N.R.	Thomson, Robert George, c. s., Asst. Commr. <i>Karnal, Panjab.</i>
1847 June 2.	L.M.	Thuillier, Major-Genl., Henry Edward Landor, R. A., C. S. I., F. R. S. <i>Care of Messrs. Grindlay and Co., 55, Parliament St., London.</i>
1865 July 5.	N.S.	Tolbort, Thos. Wm. Hooper, c. s., Offg. Deputy Commissioner. <i>Gujranwala.</i>
1871 April 5.	F.M.	Treffitz, Oscar. <i>Care of Messrs. E. D. Keilhorn and Co., 16, St. Mary Axe, London.</i>
1861 June 5.	L.M.	Tremlett, James Dyer, M. A., c. s. <i>Europe.</i>
1872 July 3.	N.R.	Trevor, William Spottiswoode, Lieut.-Col., R. E. <i>Europe.</i>
1873 April 6.	R.	Turnbull, Robert, Secretary to the Corporation. <i>Calcutta.</i>
1863 May 6.	N.R.	Tyler, J. W., M. D., F. R. C. S., Supdt. Central Prison. <i>Agra.</i>
1864 April 6.	N.R.	Vijayarāma Gujapati Raj Munniā Sultan Bahādur, Mahārājah Mirza Vijayanagram. <i>Benares.</i>
1869 Aug. 4.	R.	Wāhid Ali, Prince Jahān Qadr Muhammad, Bahādur. <i>Garden Reach.</i>
1865 Nov. 1.	R.	Waldie, David, F. G. S. <i>Calcutta.</i>
1861 May 1.	R.	Walker, Major-Genl. James T., R. E., C. B., F. R. S., Surveyor General of India. <i>Calcutta.</i>
1875 April 7.	N.R.	Wall, Dr. Alfred John, Residency Surgeon. <i>Katmandu, Nepal.</i>
1863 Oct. 7.	R.	Waller, Walter Kerr, M. B. <i>Calcutta.</i>
1865 May 3.	R.	Waterhouse, Capt. James, B. S. C., Asst. Surveyor General. <i>Calcutta.</i>
1874 July 1.	N.R.	Watt, Dr. George, Professor, Hughli College. <i>Chinsurah.</i>
1876 Dec. 6.	N.S.	Webb, W. T., M. A., Prof. Dacca College. <i>Europe.</i>
1869 Sept. 1.	R.	Westland, James, c. s., Accountant General. <i>Calcutta.</i>
1867 Feb. 6.	N.S.	Westmacott, Edward Vesey, B. A., c. s. <i>Europe.</i>
1862 Oct. 8.	R.	Wheeler, James Talboys. <i>Calcutta.</i>
1878 Aug. 29.	N.R.	Wheeler, P. C., c. s., Asst. Magistrate. <i>Ghazipur.</i>
1873 April 2.	N.R.	White, Edmond, c. s., Offg. Joint Magistrate and Collector. <i>Allahabad.</i>
1878 Sept. 25.	R.	White, The Hon'ble J. Sewell, Judge, High Court. <i>Calcutta.</i>

Date of Election.		
1875 Feb. 3.	N.R.	Whiteway, Richard Stephen, c. s., Asst. Settlement Officer. <i>Muttra.</i>
1877 April 4.	N.R.	Whitty, Irvine John, Supdt., Khurhurbari Collieries. <i>Giridhi, E I. Railway.</i>
1878 Aug. 29.	N.R.	Whittall, R., Forest Dept. <i>British Burmah.</i>
1867 Aug. 7.	N.R.	Wilcox, F., Dist. Supdt. of Police. <i>Purulia, Manbhum.</i>
1873 May 7.	N.R.	Williams, George Robert Carlisle, B. A., c. s., Offg. Joint Magt. and Collr. in charge of Ballia. <i>Ghazipur.</i>
1867 Jan. 16.	N.R.	Williamson, Capt. William John, Offg. Insp. Genl. of Police and Supdt. of Stamps. <i>Garro Hills, Assam.</i>
1876 April 5.	R.	Wilson, Alexander. <i>Calcutta.</i>
1870 Aug. 3.	N.R.	Wilson, Robert Henry, B. A., c. s., Magt. and Collr. <i>Midnapore.</i>
1878 Mar. 6.	N.R.	Wilson, J. <i>Gurgaon, Punjab.</i>
1866 Mar. 7.	L.M.	Wise, Dr. J. F. N. <i>Rostellan, County Cork. Ireland.</i>
1867 July 3.	N.R.	Wood, Dr. Julius John, Supdt. of Vaccination. <i>Ranchi.</i>
1874 Mar. 4.	R.	Wood, C. H. <i>Calcutta.</i>
1870 Jan. 5.	F.M.	Wood-Mason, James. <i>Care of Messrs. King and Co., 65, Cornhill. London.</i>
1873 Aug. 6.	N.R.	Woodthorpe, Capt. Robert Gossett, R. E., Asst. Supdt. Survey of India. <i>Frontier Expeditionary Force. Kurm Valley Column.</i>

### HONORARY MEMBERS.

1821 Mar. 6.	Sir John Phillippart. <i>London.</i>
1826 July 1.	Count de Noe. <i>Paris.</i>
1835 May 6.	Professor Isaac Lea. <i>Philadelphia.</i>
1847 Sept. 1.	Col. W. Munro. <i>London.</i>
1847 Nov. 3.	His Highness the Nawab Nazim of Bengal. <i>Murshidabad.</i>
1848 Feb. 2.	Dr. J. D. Hooker, B. N., F. R. S. <i>Kew.</i>
1848 Mar. 8.	Professor Henry. <i>Princeton, U. S.</i>
1853 April 6.	Major-Gen. Sir H. C. Rawlinson, K. C. B. <i>London.</i>
1858 July 6.	B. H. Hodgson. <i>Europe.</i>
1859 Mar. 2.	The Hon'ble Sir J. W. Colville, Kt. <i>Europe.</i>
1860 „ 7.	Professor Max Müller. <i>Oxford.</i>
1860 Nov. 7.	Monsieur Stanislas Julien. <i>Paris.</i>
1860 „ 7.	Edward Thomas. <i>London.</i>
1860 „ 7.	Dr. Aloys Sprenger. <i>Bern.</i>
1860 „ 7.	Dr. Albrecht Weber. <i>Berlin.</i>
1868 Feb. 5.	General A. Cunningham, c. s. i. <i>India.</i>

1868 Feb. 5.	Professor Bápu Déva Sástri. <i>Benares.</i>
1868 „ 2.	A. Grote. <i>London.</i>
1871 „ 7.	Charles Darwin. <i>London.</i>
1872 „ 1.	Sir G. B. Airy. <i>London.</i>
1872 June 5.	Professor T. H. Huxley. <i>London.</i>
1875 Nov. 3.	Dr. O. Böhtlingk. <i>Jena.</i>
1875 „ 3.	Professor J. O. Westwood. <i>Oxford.</i>
1876 April 5.	Col. H. Yule, R. E., C. B. <i>London.</i>
1876 „ 5.	Dr. Werner Siemens. <i>Berlin.</i>
1877 Jan. 17.	Dr. John Muir. <i>Edinburgh.</i>

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#### CORRESPONDING MEMBERS.

1844 Oct. 2.	Macgowan, Dr. J. <i>Europe.</i>
1856 June 4.	Krämer, Herr A. von. <i>Alexandria.</i>
1856 „ 3.	Porter, Rev. J. <i>Damascus.</i>
1856 „ 4.	Schlagintweit, Herr H. von. <i>Munich.</i>
1856 „ 4.	Smith, Dr. E. <i>Beyrout.</i>
1859 „ 4.	Taylor, J., Esq. <i>Bussorah.</i>
1857 Mar. 4.	Nietner, J., Esq. <i>Ceylon.</i>
1858 „ 3.	Schlagintweit, Herr R. von. <i>Giessen.</i>
1859 Nov. 2.	Frederick, Dr. H. <i>Batavia.</i>
1860 Feb. 1.	Baker, The Rev. H. <i>E. Malabar.</i>
1861 July 3.	Gösche, Dr. R.
1862 Mar. 3.	Murray, A., Esq. <i>London.</i>
1863 July 4.	Barnes, R. H., Esq. <i>Ceylon.</i>
1866 May 7.	Schlagintweit, Prof. E. von. <i>Munich.</i>
1866 „ 7.	Sherring, Rev. M. A. <i>Benares.</i>
1868 „ 5.	Holmböe, Prof. <i>Christiania.</i>

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#### ASSOCIATE MEMBERS.

1865 May 3.	Dall, Rev. C. H. <i>Calcutta.</i>
1874 Feb. 4.	Schaumburgh, J., Esq. <i>Calcutta.</i>
1874 April 1.	Lafont, Rev. F. E., s. j. <i>Europe.</i>
1875 Dec. 1.	Bate, Rev. J. D. <i>Allahabad.</i>
1875 „ 1.	Maulawí Abdul Hai, Madrasah. <i>Calcutta.</i>

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#### LIST OF MEMBERS WHO HAVE BEEN ABSENT FROM INDIA THREE YEARS AND UPWARDS.\*

\* *Rule 40.*—After the lapse of 3 years from the date of a Member leaving India, if no intimation of his wishes shall in the interval have been received by the Society, his name shall be removed from the list of Members.

The following Members will be removed from the next Member List of the Society under the operation of the above Rule.

Surgeon-Major J. Ewart, .....	1876.
Lt.-Col. J. G. R. Forlong, .....	1874.
G. W. Hoyle, Esq., .....	1873.
Dr. W. W. Hunter, .....	1875.
Col. H. Hyde, .....	1876.
Sir W. Muir, .....	1876.
Lord Napier of Magdala, .....	1873.
Isaac Newton, Esq., .....	

### LOSS OF MEMBERS DURING 1878.

#### BY RETIREMENT.

J. Behrendt, Esq. *Patna.*  
 Capt. S. H. Cowan. *Calcutta.*  
 Sir R. H. Davies. *Europe.*  
 Major-Genl. C. Douglas. *Lucknow.*  
 C. A. Elliot, Esq. *Madras.*  
 J. M. Foster, Esq. *Assam.*  
 Capt. E. A. Fraser. *Bussorah, Persian Gulf.*  
 Capt. H. C. Marsh. *Europe.*  
 Surgeon-Major W. J. Palmer. *Calcutta.*  
 C. E. Pearson, Esq. *Rawul Pindee.*  
 Sir J. B. Phear. *Ceylon.*

#### BY DEATH.

##### *Ordinary Members.*

A. Anderson, Esq. *Europe.*  
 H. Blochmann, Esq. *Calcutta.*  
 P. T. Carnegy, Esq. *Assam.*  
 T. Chennell, Esq. *Assam.*  
 Dr. E. J. Gayer. *Calcutta.*  
 C. Heintze, Esq. *Calcutta.*  
 S. Kurz, Esq. *Calcutta.*  
 Dr. T. Oldham. *Europe.*  
 Dr. A. M. Verchère. *Agra.*

##### *Honorary Members.*

M. Garcin de Tassy. *Paris.*  
 Dr. T. Thomson. *London.*

##### *Corresponding Member.*

Bleeker, Dr. H. *Europe.*



## BY REMOVAL.

*Under Rule 38.*

N. A. Belletty, Esq. *Calcutta.*  
 W. G. Bligh, Esq. *Agra.*  
 Pandit Chandra Mohun Gosvami. *Gauhati.*  
 Capt. T. St. Quintin Clutterbuck. *Amritsar.*  
 J. E. Cooke, Esq. *Calcutta.*  
 Babu Gurucharan Dás. *Krishnagar.*  
 Surgeon-Major F. W. A. DeFabeck. *Deoli.*  
 R. Forest, Esq., c. E. *Dehra.*  
 Maulavi Habiburrahman. *Calcutta.*  
 R. T. Hobart, Esq., c. s. *Allahabad.*  
 M. Kempson, Esq., M. A. *Allahabad.*  
 Capt. H. W. King.  
 J. C. Leupolt, Esq., c. s. *Etah.*  
 Babu Yogendronath Mallik. *Andul.*  
 Babu Niranjana Mukerjee. *Benares.*  
 Sashagiri M. Sastri, B. A. *Madras.*  
 G. Shelverton, Esq. *Waltair, near Vizagapatam.*  
 Major-Gen. C. L. Showers. *Amballa.*  
 Major H. R. Spearman. *Rangoon, B. Burmah.*  
 R. D. Stewart, Esq. *Raniganj.*

*Under Rule 40.*

Lt.-Col. A. S. Allan.  
 G. W. W. Barclay, Esq.  
 Sir G. Campbell.  
 Sir W. Elliot.  
 Sir J. Fayrer.  
 Sir T. D. Forsyth.  
 Col. J. C. Houghton.  
 H. Leonard, Esq.  
 Dr. C. Macnamara.  
 Lt.-Col. G. G. Pearse.  
 Dr. W. Waagen.

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[APPENDIX.]

ABSTRACT STATEMENT  
OF  
RECEIPTS AND DISBURSEMENTS  
OF THE  
ASIATIC SOCIETY OF BENGAL  
FOR  
THE YEAR 1878.



# STATEMENT, *Abstract of the Cash Account*

		RECEIPTS.		1878.	1877.
BALANCE OF 1877.					
In the Bank of Bengal, <i>vis.</i>					
Account of Stoliczka Memorial Fund, ..	329 11 2				
Account of Dr. Oldham Memorial Fund, ..	2 6 3				
Account of Piddington Pension Fund, ..	98 2 0				
Account of Asiatic Society of Bengal, ..	2,527 14 8				
		2,968 2 1			
Cash in hand, ..		156 14 7			
			3,125 0 8	3,968 1 0	
ADMISSION FEES.					
Received from Members, ..		976 0 0	976 0 0	880 0 0	
SUBSCRIPTIONS.					
Received from Members, ..		7,006 0 0	7,006 0 0	7,200 2 0	
COMMUTED SUBSCRIPTIONS.					
Received from Members, ..		100 0 0	100 0 0	770 0 0	
PUBLICATIONS.					
Sale proceeds of Journal and Proceedings, ..	378 0 0				
Subscription to ditto, ..	957 12 0				
Refund of postage stamps, ..	4 9 0				
			1,340 5 0	1,633 5 0	
LIBRARY.					
Sale proceeds of books, ..	266 0 0				
Refund of postage stamps, ..	4 11 0				
			270 11 0	227 5 0	
FINES AND COMMISSIONS.					
Fines, &c., ..	38 11 3				
Commission on purchase of Stamps, ..	4 0 6				
			42 11 9	47 7 9	
CONTINGENT CHARGES.					
Sale proceeds of book-cases, almirahs, tables, benches, &c., ..	539 0 0				
Ditto ditto a lot of bricks, ..	65 0 0				
Refund of packing charges, ..	14 6 9				
			618 6 9	21 8 0	
VESTED FUND.					
Sale proceeds of 5½% Government Securities, ..	1,000 0 0				
Interest on ditto ditto, ..	5 8 0				
Premium on ditto ditto, ..	40 0 0				
			1,045 8 0	17,501 0 11	
Carried over, Rs. ..				14,524 11	232,248 13 8

No. 1.

*of the Asiatic Society for 1878.*

DISBURSEMENTS.		1878.	1877.
PUBLICATIONS.			
Paid freight for sending Journal and Proceedings to England, .. ..	117 10 6		
Ditto Lithographing and Engraving charges, &c., .. ..	1,498 1 3		
Ditto Printing charges, .. ..	4,733 3 11		
Ditto Commission on Collecting Bills, .. ..	1 13 6		
Ditto Purchase of Postage Stamps, .. ..	180 2 0		
Ditto Packing charges, .. ..	22 2 0		
Ditto Paper for Plates, .. ..	100 10 9		
Ditto overland carriage on parcels of lithographed plates from England, .. ..	23 8 9		
Ditto Petty charges, .. ..	7 7 3		
Ditto for a Copper Plate inscription, .. ..	40 0 0		
Ditto A. Grote, Esq., in advance for publication charges of Mr. Moore's Papers on Lepidoptera, £80, .. ..	928 1 6		
		7,652 13 5	8,194 15 5
LIBRARY.			
Paid Commission on Collecting Bills, .. ..	0 7 0		
Ditto Landing charges, .. ..	17 14 9		
Ditto Book Binding charges, .. ..	303 5 0		
Ditto Salary of Punkah bearer, .. ..	82 2 3		
Ditto Subscription to the Calcutta Review, .. ..	12 0 0		
Ditto Ditto to the Medical Gazette, .. ..	15 0 0		
Ditto Ditto to Stray Feathers, .. ..	22 0 0		
Ditto Ditto to Vyakarana Mohabbashya, .. ..	8 10 6		
Ditto Ditto to Bengal Directory, .. ..	14 0 0		
Ditto purchase of books through Messrs. Trübner and Co., .. ..	944 4 6		
Ditto Ditto through Bernard Quaritch, .. ..	164 12 6		
Ditto Ditto through Messrs. L. Reeve and Co., .. ..	74 10 0		
Ditto Ditto through Robert Brandt, .. ..	20 7 3		
Ditto Ditto in Calcutta, .. ..	336 13 6		
Ditto Salary for Cataloguing Library books, .. ..	420 0 0		
Ditto Ditto for Persian Library books, .. ..	210 0 0		
Ditto Ditto for Mr. Hodgson's Nepalese MSS., .. ..	240 0 0		
Ditto Ditto for numbering Library books, .. ..	47 0 0		
Ditto Ditto for fair Copying the Library Catalogue, .. ..	243 0 0		
Ditto Ditto for sorting and arranging ditto ditto, .. ..	434 0 0		
Ditto for Kheroah Cloth for Sanskrit MSS., .. ..	114 14 0		
Ditto Tape for ditto, .. ..	4 0 0		
Ditto Paste-board for Sanskrit MSS., .. ..	24 13 6		
Ditto Insufficient and Bearing postage, .. ..	46 11 6		
Ditto Petty charges, .. ..	8 8 0		
		3,809 6 3	4,372 0 9
Carried over, Rs. ..		11,462 3 8	12,567 0 2

## RECEIPTS.

1878.

1877.

Brought over, Rs. .. 14,524 11 2 32,248 13 8

## INTEREST ON VESTED FUND.

Received from the Bank of Bengal on account  
of Government Securities, ..

.. 10,226 1 5

10,226 1 5 7,583 0 0

## DR. STOLICZKA MEMORIAL FUND.

Received by transfer of the amount paid by  
A. Grote, Esq. of London, through Messrs.  
Trübner & Co., £2-0-8½, being the balance  
of Dr. Stoliczka Memorial Fund, ..

.. 20 5 4

20 5 4 16 0 0

## DR. OLDHAM MEMORIAL FUND.

Received by transfer of the amount paid by  
Dr. G. E. Dobson of London, through  
Messrs. Trübner & Co., £3-3-0, being the  
balance of Dr. Oldham Memorial Fund, ..

.. 31 8 0

Ditto Subscriptions to the Fund, .. 132 0 0

132 0 0 163 8 0 1,068 0 0

## BLOCHMANN MEMORIAL FUND.

Received Subscriptions to the Fund, ..

.. 454 6 0

454 6 0 0 0 0

## PIDDINGTON PENSION FUND.

Received interest on Government Security  
for Rs. 500, .. ..

.. 39 0 6

39 0 6 27 8 0

## CONVERSAZIONE.

Received Subscriptions, ..

.. 255 15 0

255 15 0 0 0 0

Borrowed from O. P. Fund, ..

.. 2,000 0 0

Conservation of Sanskrit MSS. ..

.. 6 6 0

Refund of Postage and Miscellaneous, ..

.. 957 9 10 1,033 11 0

Carried over, Rs. .. 28,647 15 3 41,977 0 8

## DISBURSEMENTS. 1878. 1877.

Brought over, Rs. .. 11,462 3 8 12,567 0 2

## ESTABLISHMENT.

Paid Establishment, ..	..	..	3,817 8 0				
			<u>3,817 8 0</u>	3,817 8 0	3,991 0 0		

## CONTINGENT CHARGES.

Paid Commission on Subscriptions collected, ..	45 4 9					
Ditto Purchase of Postage Stamps, ..	141 7 0					
Ditto Insufficient and Bearing postage, ..	1 12 0					
Ditto Meeting charges, ..	213 10 6					
Ditto Advertising charges, ..	77 4 0					
Ditto Printing charges, ..	222 0 0					
Ditto pension to Islam Khan, ..	36 0 0					
Ditto fee for Stamping Cheques, ..	3 2 0					
Ditto Stationery, ..	245 5 3					
Ditto Binding Letter Files, ..	23 12 0					
Ditto Salary of Punkah Bearer, ..	38 8 0					
Ditto Subscription to the Army List, ..	16 0 0					
Ditto carpenters for the Book Shelves, ..	11 2 0					
Ditto Petty charges, ..	111 5 10					
Ditto Ticca Coolies for bringing Glass Cases						
from New Museum building, ..	14 7 9					
	<u>1,201 1 1</u>	1,452 15 8				

## FURNITURE AND FITTINGS.

Paid for two Teakwood large Glass Cases, ..	435 11 0					
Ditto Ditto a writing table, ..	25 4 0					
Ditto for polishing, repairing locks and num-						
bering 31 Glass Cases, ..	150 0 0					
Ditto cane matting for upstairs, ..	3 14 0					
Ditto repairing and polishing frames, ..	6 0 0					
	<u>620 13 0</u>	8,125 15 6				

## VESTED FUND.

Paid Commission on Selling Government						
Security for Rs. 1,000, ..	2 10 10					
Ditto Brokerage on ditto ditto, ..	1 4 0					
				3 14 10	78 8 1	
Paid Commission on collecting interest on						
Government Securities, ..	25 8 10					
	<u>25 8 10</u>	18 15 2				

## BUILDING.

Paid for cleaning and relaying drain pipes, ..	11 4 0					
	<u>11 4 0</u>	7,569 13 6				

## TAXES.

Paid Police and Lighting rates, ..	204 0 0					
Ditto House rate, ..	408 0 0					
Ditto Water rate, ..	168 0 0					
	<u>780 0 0</u>	750 0 0				

## COIN FUND.

Purchase of 1 Gold Coin, ..	40 0 0					
Ditto Silver Coins, ..	16 8 0					
Ditto 41 Copper Coins, ..	3 0 6					
	<u>59 8 6</u>	221 10 0				

Carried over, Rs. .. 17,981 13 11 34,775 14 1

## RECEIPTS.

1878.

1877.

Brought over, Rs. .. 28,647 15 3 41,977 0 8

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 Total Rs. .. 28,647 15 3 41,977 0 8
 

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Errors and Omissions Excepted.

KEDAR NATH BYSACK,

*Cashier, Asiatic Society.*

Examined and checked against the account.

J. WESTLAND.

R. LYDEKKER.

 ASIATIC SOCIETY'S ROOMS,  
*Calcutta, 1st Jan., 1879.*

## DISBURSEMENTS. 1878. 1877.

Brought over, Rs. .. 17,981 13 11 34,775 14 1

## DR. OLDHAM MEMORIAL FUND.

Paid Landing charges, wharfrent, cooley, &c., on 3 Cases of marble busts and pedestals, ..	12 12 9	12 12 9	1,196 1 9
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## DR. STOLICZKA MEMORIAL FUND.

Paid freight and Landing charges, &c., on 3 Cases of marble busts and pedestals, ..	69 1 0		
Ditto Postage for sending Photographs to Subscribers, .. ..	2 8 6		
Ditto Printing charges, .. ..	5 0 0	76 9 6	20 15 3

## PIDDINGTON PENSION FUND.

Paid Commission on Collecting interest on Government Security, .. ..	0 1 7	0 1 7	0 1 2
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## BLOCHMANN MEMORIAL FUND.

Paid Printing charges, 400 copies of Circular, Ditto Advertising the list of Subscribers to the Fund, .. ..	18 4 0 106 0 0	124 4 0	0 0 0
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## COPYING MSS.

Paid for Copying charges, .. ..	41 0 0	41 0 0	0 0 0
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## CONVERSAZIONE.

Paid for refreshment, &c., .. ..	225 0 0		
Ditto Printing charges for notices and Cards, ..	9 6 6		
Ditto Advertising charges, .. ..	2 4 0		
Ditto Petty charges, .. ..	19 6 0	256 0 6	0 0 0
Repaid to O. P. Fund, .. ..	2,000 0 0		
Loan to Conservation of Sanscrit Manuscripts, ..	6 6 0		
Postage and Miscellaneous, .. ..	932 4 6	2,938 10 6	

## BALANCE.

In the Bank of Bengal, viz. Account of Stoliczka Memorial Fund, .. ..	273 7 0		
Account of Dr. Oldham Memo- rial Fund, .. ..	153 1 6		
Account of Blochmann Memo- rial Fund, .. ..	330 2 0		
Account of Piddington Pension Fund, .. ..	137 0 11		
Account of Asiatic Society of Bengal, .. ..	6,265 14 11	7,159 10 4	
Cash in hand, .. ..	57 0 2	7,216 10 6	3,125 0 8
		Total, Rs., ..	28,647 15 3 39,118 0 11

Errors and Omissions Excepted.

KEDAR NATH BYSACK,  
Cashier, Asiatic Society.

Examined and checked against the account.

J. WESTLAND.

R. LYDEKKER.

ASIATIC SOCIETY'S ROOMS,  
Calcutta, 1st Jan., 1879.

# STATEMENT, *Abstract of the Cash Account,*

	RECEIPTS.	1878.	1877.
BALANCE OF 1877.			
In the Bank of Bengal, <i>viz.</i>			
Dr. J. Muir's account, ..	898 10 0		
The Government, N. W. P., for			
Beal's Oriental Dictionary ac-			
count, ..	1,500 0 0		
O. P. Fund account, ..	129 7 1		
	<hr/>	2,528 1 1	
Cash in hand, ..		200 9 6	
		<hr/>	2,728 10 7 3,153 3 2
ORIENTAL PUBLICATIONS.			
Received by sale of Bibliotheca			
Indica and by Subscription to			
ditto, ..	2,708 8 0		
Ditto Refund of postage and			
packing charges, ..	42 4 8		
Ditto Commission on Postage			
Stamps, ..	0 3 9		
	<hr/>	2,751 0 5	2,379 2 3
GOVERNMENT ALLOWANCE.			
Received from General Treasury at 500 Rs.			
per month, ..	6,000 0 0		
Ditto ditto additional grant for the Publica-			
tion of Sanskrit Works, at 250 Rs. per			
month, ..	3,000 0 0		
	<hr/>	9,000 0 0	9,000 0 0
CUSTODY OF ORIENTAL WORKS.			
Received fines, &c., ..	12 3 9		
	<hr/>	12 3 9	8 8 0
Asiatic Society of Bengal, ..	2,000 0 0		
Messrs. Brajbhushana Dass and Co., ..	42 0 6		
Prof. E. B. Cowell, ..	66 12 0		
Pandita Rangacharjya, ..	3 0 0		
Pandita Jaistharam Mukundjee, ..	19 5 9		
Babu Jadubindo Bysack, ..	30 5 6		
	<hr/>	2,161 7 9	2,553 9 3

Carried over, Rs., .. 16,653 6 6 17,094 6 8

No. 2.

*Oriental Publication Fund, 1878.*

DISBURSEMENTS.				1878.	1877.
ORIENTAL PUBLICATIONS.					
Paid for Advertising charges, ..	..	170	0 0		
Ditto Postage Stamps, ..	..	72	2 6		
Ditto Freight for sending books, ..	..	74	2 0		
Ditto Commission on collecting bills, ..	..	1	15 6		
Ditto Coolies for removing books and shelves, ..	..	17	13 0		
Ditto by transfer of Bibliotheca Indica to Bernard Quaritch, Esq., ..	..	20	0 0		
Ditto Petty Charges, ..	..	10	15 8		
				367	0 8 638 1 9
CUSTODY OF ORIENTAL WORKS.					
Paid Salary of the Librarian, ..	..	510	0 0		
Ditto Establishment, ..	..	729	0 0		
Ditto Fee for stamping Cheques, ..	..	3	2 0		
Ditto Book-binding charges, ..	..	45	8 0		
				1,287	10 0 1,334 6 0
CATALOGUE OF SANSKRIT MSS.					
Paid Salary for Cataloguing Sanskrit MSS., ..	..	480	0 0		
				480	0 0 480 0 0
GOBHILYA GRIHYA SUTRA.					
Paid Editing charges, ..	..	524	0 0		
Ditto Postage Stamps, ..	..	1	2 0		
				525	2 0 1 0 0
ĀIN I AKBARI.					
Paid Editing and Printing charges, ..	..	800	8 0		
Ditto Lithographing and Printing charges, ..	..	48	8 0		
				849	0 0 1,332 4 0
SAMAVEDA SANHITA.					
Paid Editing and Printing charges, ..	..	819	0 0		
				819	0 0 3,281 9 0
BIOGRAPHICAL DICTIONARY.					
Paid Editing and Printing charges, ..	..	356	0 0		
				356	0 0 364 4 0
CHATURVARGA CHINTAMONI.					
Paid Editing and Printing charges, ..	..	2,150	8 3		
				2,150	8 3 1,845 11 0
BHĀMATI.					
Paid Printing charges, ..	..	166	0 0		
Ditto Freight, ..	..	5	13 6		
				171	13 6 0 0 0
AGNIPURANA.					
Paid Editing and Printing charges, ..	..	1,064	7 0		
				1,064	7 0 735 10 0
Carried over, Rs., ..				8,070	9 5 10,012 13 9



	1878.	1877.
Brought over, Rs., ..	16,653 6 6	17,094 6 8

Total, Rs., ..	16,653 6 6	17,094 6 8
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Errors and Omissions Excepted.

KADER NATH BYSACK,  
Cashier, Asiatic Society.

Examined and checked against the account.

J. WESTLAND.  
R. LYDEKKER.

ASIATIC SOCIETY'S ROOMS,  
Calcutta, 1st Jan., 1879.

			1878.	1877.		
	Brought over, Rs., ..	8,070	9	5	10,012	13 9
<b>LALITA VISTARA.</b>						
Paid Editing and Printing charges,	..	438 0 3	438	0 3	0 0 0	
<b>TAITTIRIYA SANHITA.</b>						
Paid Editing charges,	..	96 0 0	96	0 0	0 0 0	
<b>KATANTRA.</b>						
Paid Printing charges,	..	927 12 4	927	12 4	0 0 0	
<b>PRITHIRAJ RASU.</b>						
Paid Editing charges,	..	144 0 0	144	0 0	0 0 0	
<b>The Government, N. W. P., for Beal's Oriental Dictionary,</b>						
Paid Editing charges,	..	450 0 0				
Ditto Postage Stamps,	..	10 0 0	460	0 0	0 0 0	
<b>SANDILYÁ SUTRÁ.</b>						
Paid Printing charges,	..	497 2 0	497	2 0	0 0 0	
<b>Loan to Asiatic Society of Bengal,</b>						
Messrs. Brajbhushana Dass and Co.,	..	2,000 0 0				
Babu Mehr Chand,	..	3 3 6				
Babu Jadubindo Bysack,	..	0 6 0				
Pandita Rangacharjya,	..	71 14 0				
Pandita Jaistharam Mukundjee,	..	3 0 0				
Rev. T. Foulkes,	..	19 5 9				
Prof. E. B. Cowell,	..	0 6 1				
G. V. Chinatombi, Esq.,	..	71 12 0				
	..	1 12 2	2,171	11 6	34 13 3	
<b>BALANCE.</b>						
<b>In the Bank of Bengal, viz.</b>						
Dr. J. Muir's account,	..	898 10 0				
The Government, N. W. P., for Beal's Oriental Dictionary account,	..	1,040 0 0				
O. P. Fund account,	..	1,886 2 3				
	..	3,824 12 3				
Cash in hand,	..	23 6 9	3,849	3 0	2,728 10 7	
<b>Total, Rs., .. 16,653 6 6 12,776 5 7</b>						

Errors and Omissions Excepted.

KADER NATH BYSACK,  
Cashier, Asiatic Society.

Examined and checked against the account.

J. WESTLAND.  
R. LYDEKKER.ASIATIC SOCIETY'S ROOMS,  
Calcutta, 1st Jan., 1879.

## STATEMENT

*Conservation of Sanskrit MSS. Fund in Account*

	Cr.	
BALANCE OF 1877.		1878.
In the Bank of Bengal, .....	312 0 2	
Cash in hand, .....	37 0 0	
		349 0 2
Received from the Government of Bengal, the amount sanctioned towards the Conservation of Sanskrit MSS., being 2nd half of 1877-78, .....	1,600 0 0	
Ditto ditto 1st half of 1878-79, .....	1,600 0 0	
Sale proceeds of 35 copies, Notices of Sanskrit MSS., .....	35 0 0	
Refund of Postage Stamps, .....	0 3 0	
Refund from Dr. Rájendralála Mitra, of the amount paid on the 21st March 1878 for purchase of Sanskrit MSS., ....	200 0 0	
Ditto from ditto ditto paid on the 9th August, 1st and 14th September, 1877, for purchase of Sanskrit MSS., .....	2,400 0 0	
Received from Asiatic Society of Bengal, .....	6 6 0	
		5,811 9 0

Total, Rs. .... 6,190 9 2

Examined and checked against the account.

J. WESTLAND.

R. LYDEKKER.

ASIATIC SOCIETY'S ROOMS.

Calcutta, 1st Jan., 1879.

NO. 3.

*Current with the Asiatic Society of Bengal.*

Dr.		1878.
Paid Salary for preparing Catalogue of Sanskrit MSS.,....	360 0 0	
Ditto ditto for translating ditto,.....	240 0 0	
Ditto ditto for travelling Pandit, .....	562 8 0	
Ditto Contingent charges for travelling Pandit, .....	23 2 0	
Ditto Travelling Allowance for ditto ditto, .....	354 15 0	
Ditto Purchase of Sanskrit MSS., .....	269 15 0	
Ditto Paste-board for ditto,.....	59 4 9	
Ditto Kheroah cloth for ditto,.....	67 10 0	
Ditto Tape for ditto,.....	6 2 0	
Ditto Dr. Rājendralāla Mitra, as an advance for purchase of Sanskrit MSS., .....	700 0 0	
Ditto Librarian, his salary from May 1877 to April 1878,..	150 0 0	
Ditto Salary for bearer, .....	84 0 0	
Ditto Postage Stamps, .....	24 7 6	
Ditto Freight for Sanskrit MSS., .....	19 1 0	
Ditto Dr. Rājendralāla Mitra for copying and purchase of 445 copies of Sanskrit MSS.,.....	2,285 10 0	
Ditto travelling expenses for ditto ditto in search of Sanskrit MSS. from Gaya to Arrah, Dumraon and Patna, includ- ing carriage hire and sundries, .....	175 10 0	
Ditto Railway freight, packing charges, cart and coolies, telegraphic messages, .....	37 7 0	
Ditto Petty Charges, .....	5 13 6	
Ditto Asiatic Society of Bengal,.....	6 6 0	
		5,431 15 9
BALANCE OF 1878.		
In the Bank of Bengal, .....	589 5 2	
Cash in hand, .....	169 4 3	
		758 9 5

Total, Rs. .... 6,190 9 2

Errors and Omissions Excepted

KEDAR NATH BYSACK,  
Cashier, Asiatic Society.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JANUARY, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 8th instant, at 9 P. M.

W. T. BLANFORD, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed :—

The following gentlemen, duly proposed and seconded at the last Meeting, were ballotted for and elected Ordinary Members—

R. Sewell, Esq., M. C. S.

J. F. Browne, Esq., C. E., M. R. A. S.

Capt. W. E. Gowan.

The following are candidates for ballot at the next meeting—

1. Lieut. C. R. Macgregor, Quarter Master, 44th N. I., Shillong, proposed by Dr. Anderson, seconded by G. H. Damant, Esq., C. S.

2. Major J. Sconce, B. S. C., Depy. Surveyor General of India, proposed by Col. J. T. Walker, R. E., C. B., seconded by Capt. J. Waterhouse.

3. J. F. Duthie, Esq., Superintendent Botanical Gardens, Saharanpore, proposed by Dr. G. King, seconded by Capt. J. Waterhouse.

The SECRETARY announced that Dr. W. J. Palmer had intimated his desire to withdraw from the Society on proceeding to England.

In the absence of Dr. Hoernle, Philological Secretary, Mr. C. H. TAWNEY read the following note on Jainism received from Mr. E. Thomas :

*Jainism.*

Among other questions put down for consideration and discussion at the 'Congrès des Orientalistes' at Lyons, on the 31st of August last, there was formulated a subdivision devoted to "Les Djaïnas sont-ils d'anciens Bouddhistes antérieurs à Sakia Mouni, ou des Bouddhistes modifiés depuis les persécutions brahmaniques ?"

As I have paid some attention to this subject,\* though unable to attend the Congress, and therefore unaware of the course taken in the dis-

\* 'Jainism ; or, the Early Faith of Asoka' (Trübner, 1877) ; J. R. A. S., IX, p. 155.

cussion, you will, perhaps, allow me to advert in your columns to a very important item, bearing upon the relative priority of the creeds of Jainism and Buddhism which has not hitherto been noticed; that is to say, how their reputed dates balance and adjust themselves *inter se* within the bounds of reasonable probability.

The Jains have a fixed and definite date for the *Nirvāna* of "Mahāvīra," their great saint, which is established by the concurrent testimony of their two sects, whose method of reckoning varies in itself, thereby securing, as it were, a double entry. The Svetambaras date in the era of Vikramāditya, 57 B. C.; the Digambaras reckon by the Saka *samvat*, 78 A. D., and both arrive at the same figures of B. C. 526-7 for the death of Mahāvīra. This calculation is equally supported by the dynastic lists, which satisfactorily fill in *the* period from the accession of "Pálaka, the lord of Avanti, [who] was anointed in that night in which.....Mahāvīra entered Nirvāna," "to the four years of Saka," who immediately preceded Vikramāditya.\*

On the other hand, Buddha's date varies according to different authorities from the extreme points of B. C. 2420 to 453, and even is reduced so low as 370 B. C.; so that up to this time modern inquirers have been unable to concur in the determination of this epoch† further than to suspect, as we are taught by the Chinese, that the period was antedated from time to time, with the direct purpose of arrogating priority over other saints.

Now, if the ascertained Jain date will serve to determine the era of Buddha, under the theory that Buddha *himself* was a disciple of Mahāvīra, it will, in the fact, go far to establish the priority of the latter, and the pre-existence of the creed of which he was the twenty-fourth or last prophet.

The date of Buddha most largely accepted has been adopted from the Ceylon annals, which supply the figures 543 B. C.‡ But, as was remarked by Mr. Turnour, who first investigated the local traditions, the acceptance of such a date involved an error, in default of the required period of sixty years (sixty-six); or, to use his own words, "the discrepancy can only proceed from one of these two sources; viz., either it is an intentional perversion, adopted to answer some national or religious object, which is not readily discoverable; or Chandra Gupta is not identical with Sandra-

\* Dr. Bühler, 'Indian Antiquary,' Vol. II, 363; J. R. A. S., IX, 15, note 2.

† Prof. Wilson, J. R. A. S., XVI, 247; see also IX, n. s. 170; Beal, 'Travels of Fah-Hian,' pp. xxvi. 22; and Hioun-Tsang (Paris, 1857), I, p. 163.

‡ Lassen; St. Hilaire; M. Barth, *Revue Critique*, 13th June, 1874; Prof. Weber, 'History of Indian Literature' (London, Trübner, 1878), p. 287; Childers, Pāli Dictionary. I myself am only a recent convert, J. R. A. S., I. 463.

cottus.”\* A partial reconciliation of the error was proposed by the method of restoring to the dynasty of the Nandas the full hundred years assigned to them by some Paurānik authorities, in lieu of the forty-four allowed for in the Ceylon lists; but if the local annals were so dependent for their accuracy upon extra-national corrections, their intrinsic merits could have stood but little above zero; and any such summary introduction of sixty-six years from outside sources could scarcely have been held to be satisfactory, unless the *assumed* total of 543 years B. C. were proved to be a *fixed quantity* by better external testimony than has hitherto been adduced.

To General Cunningham belongs the merit of having first proposed, in 1854, the fixing of Buddha's *Nirvāna* in “477 B. C.”†—a result which he obtained from original figure calculations; while Max Müller, in 1859, independently arrived at the same conclusion, from a more extended critical review of the extant literary evidence.‡

General Cunningham has lately enlarged the sphere of his observations, and in adopting Colebrooke's view in regard to the fact that Gautama Buddha was “the disciple of Mahāvīra,” has materially fortified his early arguments—in re-asserting that the *Nirvāna* of Buddha must be placed in “478 B. C.,” or “forty-nine years”§ after the *release* of Mahāvīra, the last of the Jinās.

The passages relied upon by Colebrooke in 1826|| have since been confirmed by important contributions from other sources. None, however, bring the question home so distinctly and in so quaintly graphic a way as Prof. Weber's translation of a passage from the ‘Bhagavatī,’¶ wherein the *Chela*, “the holy Mahāvīra's eldest pupil, Indrabhūti”—“houseless of Gautama's Gotra,”—begins to distrust the negative perfection of Jainism, in the terms of the text,—“Thereupon that holy Gautama, in whom faith, doubt, and curiosity arose, grew and increased, rose up. Having arisen, he went to the place where the sacred Ćramana Mahāvīra was.....After performing these [salutations] he praises him and bows to him. After so doing, not too close, not too distant, listening to him, bowing to him, with his face towards him, humbly waiting on him with folded hands, he thus spoke.....”

In conclusion, I may recapitulate certain deductions, which I have suggested elsewhere. The juxtaposition of the last representative of the

\* The Mahāwanso, Ceylon, 1837, pp. xlviii, l.-lii, &c.

† Journal Asiatic Society of Bengal, 1854, p. 704.

‡ ‘Ancient Sanskrit Literature,’ London, 1859, p. 298.

§ ‘Corpus Inscriptionum Indicarum,’ Calcutta, 1877, p. v.

|| Prof. Cowell's edition of Colebrooke's ‘Essays,’ II, 278; Transactions Royal Asiatic Society, I, 520.

¶ ‘Fragment der Bhagavatī,’ Berlin, 1867.



one faith with the first exponent of the other, which took over so many traditions that it retained in common with the parent creed, is a point of marked importance. Eclipsed for a time by the energy of the reformers, whose missionaries carried the Buddhist doctrines over so large a section of the globe, non-proselytizing Jainism has survived in its simplicity—as the natural outcome of the ideas and aspirations of a primitive race—still undisturbed in the land of their common birth; while Buddhism, with its fantastic elaborations, retains scant honour, and no place within the limits of its *nidus* in India proper. (*Athenæum*.)

Mr. W. T. BLANFORD exhibited the skin and skull of a bear from the neighbourhood of Gwádar, and read the following—

*Note on the 'Mamh' or Baluchistan Bear, Ursus gedrosianus.*

In November 1877, I exhibited to the Society a skin of the bear inhabiting Baluchistan.\* In the belief that this skin, which was of a brown colour, indicated the existence of an animal previously undescribed, I proposed to call the species *Ursus gedrosianus*. From various sources, however, both before and after the publication of the paper, I had heard that a black bear occurs in Baluchistan, and it remained to be seen whether there were two species, or whether the colour was variable. Moreover as no skull had been examined, the affinities of the animal remained doubtful.

I am indebted to my friend Major Mockler, who sent me the first specimen, for enabling me to clear up this difficulty. He has succeeded in procuring from the neighbourhood of Gwádar a second skin, in better condition than the first, and with the skull. The fur of the skin now sent, although far from being as black as in Himalayan specimens of *Ursus torquatus*, is very much darker than in the example previously received; the hairs are rather coarse, but there is no marked distinction from those of the Himalayan black bear. The Baluchistan skull is scarcely distinguishable from one in the Indian Museum, belonging to a female *U. torquatus*, recently living in the Zoological Gardens at Alipore.† The following are the dimensions of the skull from Gwádar.

	inches	millem.
Length from the lower margin of the <i>foramen magnum</i>		
to end of premaxillaries, .....	9·7	246
Ditto from occiput to do.....	10·45	265
Breadth across zygomatic arches,.....	6·9	175
Least breadth of cranium between orbits, .....	2·9	73

\* P. A. S. B., 1877, p. 204; J. A. S. B., XLVI, Pt. 2, p. 317.

† I am indebted to Dr. Anderson for calling my attention to this specimen.

Width of muzzle behind canine teeth,.....	2·6	64
Length of bony palate from the opening of the posterior nares to the anterior border of the premaxillaries,.....	5·52	140
Length of the lower jaw from angle to symphysis, ...	7·55	192
Height of ditto,.....	4·3	110

I should have been disposed to consider the Baluchistán bear identical with *U. torquatus* (*U. tibetanus*) but for the arrival of another skull of the former at the Indian Museum. This, although fully adult, is so much smaller than any full grown skull of the Himalayan black bear, as to render it possible that the first skull, although precisely corresponding in size to that of a female *U. torquatus*, belonged to a male *U. gedrosianus*. The latter can, however, be but little more than a race or sub-species of the former, and is evidently a near ally.

The distribution of the Himalayan black bear, if the Baluchistán form be classed as a sub-species, is very anomalous and remarkable. It is essentially a forest animal inhabiting the slopes of the Himalayas and parts of Southern China, and, it is said, even Eastern Siberia, whilst a closely allied species is found in Japan. But the extension of this Himalayan form to the mountains of Baluchistan has no known parallel amongst other animals. The fauna of Baluchistan is desert with an admixture of Indian types, but the Indian types are those of the Indian Peninsula and not of the Himalaya. The most characteristic Indian forms in Baluchistan\* are such animals as *Sciurus palmarum*, *Gerbillus indicus*, *Athene brahma*, *Gymnoris flavicollis*, *Ortygornis ponticeriana*, &c., but nearly all are Peninsular types in India, prevalent in the drier parts of the Peninsula, and as a rule wanting both in the Himalayas and to the eastward of the Bay of Bengal. The only known Baluchistan species that range to the east of the Bay of Bengal are two birds, *Pratincola caprata* and *Butastur teesa*, and a lizard, *Calotes versicolor*. But all these abound in the plains of India, and no example has hitherto been known of an animal wanting in the Indian peninsula, but occurring in the Himalayas and also in the hills of Baluchistan. The very great difference in physical conditions between the damp forest-clad slopes of the Himalayas and the bare ranges of the Baluchistan highlands renders it very surprising that the same or closely allied types of bear should be found in both areas.

The PHILOLOGICAL SECRETARY read the following extracts from a letter from Bābu Haris'chandra to Dr. Rājendralāla Mitra on a new Hindi book—*Drista-kūṭa* of Sūr Dās, with his own commentary.

\* Eastern Persia, Vol. II, p. 15.

"Two or three days ago I found quite a new Hindi book : *Dristakūṭa* of *Súr Dás* with his own commentary. The book contains at the end a sketch of the author's biography, which differs from the story of his life hitherto known. The *Vártá* of 84 *Vaishnavas* also contains some biography of *Súr Dásjī*. It mentions that he was a *Sárasvata Bráhmaṇ*, and was the son of poor parents, and had no brothers. His village was *Síhí* near *Delhi*. This is the idea we *Vaishnavas* believe. But the poetry at the end of this new book says—He was born in *Práth Jagat Gotra*. The founder of his family was *Brahma Ráo*. In the family of *Brahma Ráo*, there was a man *Bhoncehand* or *Chand* in the time of *Prithviráj*. The king *Prithviráj* gave him *Joálá Désa*. He had four sons. First *Nareśa*, second *Guṇachand*, third and fourth not told. *Sílachand* was *Guṇachand*'s son. From him *Bírchand*. In his family *Hariśchand* was most famous. He lived first in *Agra*, and then in *Gopáchal*, where he got a son, name not told (or if the word *Bir* is a proper name, it must be *Bírchandra*). He had seven sons : *Krishnachand*, *Udánchand*, *Rúpchand*, *Buddhichand*, *Devachand*, *Prabodhachand*, and *Surajchand*. If the word *Rúpchand* be taken as an adjective, the name of the fourth son would be *Prakáśchand*. All these were slain in the *Muhammadan* battles, except one, *Surajchand*, who was blind. (It seems that then his family had fallen into a low state.) *Surajchand*, walking out, once fell into a well, whence he was saved by *Srí Krishna*. No one helping him he was for seven days in that blind well, but *Srí Krishna* himself saved his life, and showed him his own beauty—full *svarūpa*. He named him *Súr*, *Súr Dás* and *Súrasyám*. Then he went to *Vraj*, where *Gosainji* (son of *Srí Vallabháchárya*) made him one of अष्टदाश *Vaishnavas*.

The *Bhaktamál* says that *Súr Dás* was a *Bráhmaṇ*, no doubt, but he was living at *Gaughát*, a place near *Agra*, and so all other *Vaishnava* granthas say. He was a great poet, as told

“खर खर तुलसी सरी उडुगन केशवदास ।

अब के कवि खद्योत सम जहं तहं करहिं प्रकास ॥

जो कुछ कही सो अंधरै कही कविरा कही अनूठी ।

बाकी बची सो तुलसी कही अब कहै सो भूठी or जूठी ॥”

It is said that the famous poet *Behári* once, when walking about, saw a man very uneasy. Then he asked him—

किधौं खर कर सर लम्यौ किधौं खर की पीर ।

किधौं खर को पद सुन्यो जो अस विकल सरीर ॥

प्रथम ही प्रथ जगाते में प्रगट अद्भुत रूप ।

ब्रह्म एव विचारि बृह्मा धरै नाम अनूप ॥

पान पय देवी दियो सिव आदि सुर सुख पाय ।  
 कछौ दुर्गा पुत्र तेरो भयो अति अधिकाय ॥  
 तासु वंस प्रसंस में भौ चन्द चार नवीन ।  
 पारि पायन सुरन के पितु सहित अलुति कीन ॥  
 भूपृथ्वीराज दीन्हो तिनहै जाला देस ।  
 तनय ताके चार कीन्हो प्रथम आप नरेस ॥  
 दूसरे गुनचन्द ता सुत सीलचन्द सरूप ।  
 बीरचन्द प्रताप पूरन भयो अद्भुत रूप ॥  
 रतभार हमीर भूपति संग खेलत आय ।  
 तासु वंस अनूप भो हरिचन्द अति विख्याय ॥  
 आगरे रहि गोपचल में भयो ता सुत वीर ।  
 पुत्र जन्मे सात ताके महाभट गम्भीर ॥  
 कृष्णचन्द आरचन्द जू रूपचन्द सुभाइ ।  
 बुद्धिचन्द प्रकास चौथो चन्द भो सुखदाइ ॥  
 देवचन्द प्रबोध संसृत चन्द ताको नाम ।  
 भयो सप्तो नाम खरजचन्द मन्द निकाम ॥  
 सो समर करि स्याहि सेवक गए विधि के लोक ।  
 रह्यो खरज चन्द दग में हीन भरवर सोक ॥  
 परो कूप पुकार काहू सुनी ना संसार ।  
 सातएँ दिन आय जटुपति कीन आप उधार ॥  
 दियो चख दै कही सिधु सुनु मांग बर जो चाइ ।  
 है कछौ प्रभु भगति चाहत सनु नास उपाइ ॥  
 दूसरो ना रूप देखैं देखि राधा स्याम ।  
 सुनत करना सिन्धु भाखी एवसु सुधाम ॥  
 प्रबल दन्दिन विप्र कुल तेँ सनु कै है नास ।  
 अघित बुद्धि विचार विद्यामान मानै सास ॥  
 नाम राखे मोर खरजदास खर सुस्याम ।  
 भए अन्तरधान वीते पाव ली निसिजाम ॥  
 मोहि पन सोइ है ब्रज की वसे सुख चित्तथाप ।  
 थापि गोसाईं करी मम आठ मखे बाप ॥  
 विप्र प्रत्य जगात को है भाव भूर निकाम ।  
 खर है नंद नन्द जू को लये मोल गुलाम ॥

Súr Dás was very famous among Hindi poets. He was one of 84 Bhaktas of the Vallabháchárya sect. Vallabháchárya was born in the year 1478 corresponding with the Vikram Era, 1535."

The following papers were read—

1. *Place names met with during the season 1877-78, mostly in the Kávéri delta and Tanjore District.*—By LIEUT.-COL. B. R. BRANFILL, *Depy. Superintendent Survey of India.*—Communicated by COLONEL J. T. WALKER, C. B., R. E., *Surveyor General of India.*

This paper will be published in the Journal, Part I.

2. *Pali Derivations in Burmese.*—By H. L. ST. BARBE, ESQ., C. S.  
(Abstract.)

The Burmese have borrowed their alphabet, religion and a great portion of their language from India. The alphabet was no doubt introduced at a very early period. It has never been analyzed in any case, but its square variety approximates more closely to the Áśoka and fifth century B. C. inscriptions than any later Indian modifications. It was adopted *en bloc*, though the Burmese have never themselves found any use for 12 out of 34 consonants, and have altered several of the sounds, notably the 2nd *varga* from "c" and "y" to "s" and "z," the vowel "ai" into "ê" (pronounced more or less like the "e" in there) and the o into ô (like the aw in "law.") The bulk of the Aryan element found its way into the Burmese language through a Pali channel. But Sanskrit words had entered the language before this without any connection with Buddhism. The names for the days of the week are derived from a Sanskrit source, and some other words such as *missa*, a ram, (Sans. *mesha*) *pritta* (Sans. *preta*, the dead) *prassad*, a town, (Sans. for *ásáda*), seem to point to a time when foreign vocabularies were written down as they sounded in Burmese without reference to their etymology. The importation of those words is due to Indian immigrants who founded kingdoms in Burmah (the Sorehkhhetarâ kingdom was founded B. C. 482) and were the pioneers of civilization there. At present, words of Indian extraction constitute more than one-seventh of the entire Burmese vocabulary. The process of engrafting Aryan vocabularies on a Mongoloid stock must be more or less clumsy and inadequate. Gautama himself would not understand ten words together of his own doctrine as recited by a *phungyi*, and most certainly will not make himself intelligible to a Burmese audience. The character must always be a most unsatisfactory one to adopt for a new dialect or language, and it is a great misfortune that the Latin alphabet has not been used in reducing the Karen language to writing.

There is, however, a certain method observable in the appropriation of Pali terms. The author has been able to frame a simple set of rules which are tolerably comprehensive, and which may be of some use in dealing with future importations. These rules form the most important part of the paper which will be published in the Journal, Part I.

3. *Prehistoric Remains in Central India.*—By H. RIVETT-CARNAC, ESQ.,  
C. S., C. I. E., M. R. A. S., F. S. A., &c.

(Abstract.)

This paper contains an account of the remains discovered by the author in the barrows near Junapani, a hamlet lying about 5 miles to the west of the civil station at Nágpur, in the Central Provinces. These tumuli, which are by the people of the neighbourhood ascribed to giants or to the Gaoli or shepherd kings, regarding whose rule in Central India prior to the Aryan invasion a deep-rooted tradition exists, are surrounded with double rows of trap boulders selected from the masses with which the hill-side is strewn. On those selected stones are found the "cup-marks" resembling those found on exactly similar tumuli in Europe.

The remains discovered were all found in the centre of the barrows. The earth dug through was invariably hard and firm, as if compressed by many centuries into its present compact shape.

The first indication of a "find" is broken pieces of pottery of red and black clay, 2 or 2½ feet below the surface. The fragments of metal implements and ornaments are found, and further pieces of broken pottery, evidently the fragments of urns. With the urns is found a whitish-coloured earth, probably the remains of bones.

In a plate accompanying the paper are represented some iron instruments found in these barrows, among them the best specimen of the battle-axe or hatchet that has yet been discovered. It was found by Mr. Henry Dangerfield in one of the outlying groups of barrows near Junapani. The bands with which the axe was fastened to the wooden handle are in perfect preservation.

Another plate represents six bangles or bracelets found in a mound adjacent to that in which the axe was found.

In a third plate are represented some instruments dug out of a barrow which Mr. Rivett-Carnac supposes to have been the grave of a chieftain. Among them are arrow-heads, axes, spear-heads, a snaffle bit in excellent preservation, and what Mr. Rivett-Carnac supposes to be a pair of iron stirrups.

It is generally supposed that the "cup-marks" are a rude kind of ornamentation. But Mr. Rivett-Carnac has observed on these boulders



which he has examined, a striking combination of large and small cups. He is therefore of opinion that this combination of marks may have some secret meaning yet to be discovered. He remarks that those who are acquainted with the system of printing by the electric telegraph, and the combination of long and short strokes in the Morse code, and the recent arrangements for communicating signals to troops at night, will agree that these marks may have some hidden signification. He connects these marks also with that found in the Kumaon Hills, and described in the Society's Journal for January 1877, believes them in some cases to be the remains of Mahadeo worship.

He thus sums up the results of his paper :

(1.) The sketches shew that the shape of the tumuli in India and Europe is the same.

(2.) The Barrows in India and Europe always face towards the South.

(3.) The remains found in the Indian barrows resemble almost exactly the remains dug out of the burial-places of Europe.

(4.) The cup-marks on the boulders which surround the Indian tombs are identical with the marks found on the stones placed round the same class of tumuli in Europe.

The paper will be published in the Journal, Part I.

The PRESIDENT said that he had been until recently under the impression that the stone circles of Nágpur had already been fully described, but that having occasion lately to search for a description of them, he had been unable to find any sufficient account, and he was therefore very glad that Mr. Rivett-Carnac had furnished the necessary details. These curious remains are of peculiar interest and deserve more attention than they have hitherto received. Rude stone monuments, sometimes in the form of circles, sometimes of cromlechs or kistvaens, and occasionally of both together, the connexion being such as to shew that all are probably the work of the same people, have been found in the extreme north-west of India near Pesháwar and in many places in the Peninsula, as at Nágpur, in several parts of the Hyderabad territory, in Mysore, Coorg, on the Nilgiri hills, in Malabar, Coimbatour, Salem, Tinnevely, &c., and near Madras. In Southern India the rings are generally known as Koramba rings, and it is curious, as noticed by Mr. Foote, that near Madras some are formed of laterite, in which, in the same neighbourhood, palæolithic human implements are imbedded. The best descriptions hitherto given of any explorations are those of Capt. Meadows Taylor, who excavated some of the stone circles and kistvaens, here found together, near Ferozabad and Shorapur in the Decan, west of Hyderabad, and gave a full account of his discoveries in the

Journal of the Bombay Branch of the Royal Asiatic Society (Vol. III, Pt. 2, p. 179, and IV, p. 380,) and in the Transactions of the Royal Irish Academy (Vol. XXIV, Antiquities, p. 329.) He found cists containing skeletons, some of them headless, and thus furnished the necessary link between the stone circles of Nāgpur, in which enclosed chambers are wanting and the bones appear to have decayed, and the burial-places of the Scythian tribes.

The distribution of these monuments in India is so peculiar and restricted, that they are very probably the tombs of an immigrant race, and not of an aboriginal population. The so-called aboriginal tribes of the country, such as the Gonds, appear, as a rule, to have no knowledge of the remains. If the curious articles supposed by Mr. Rivett-Carnac to be a snaffle bit and stirrups are really what he thinks them to be, they would furnish another connecting link between the circle-building race and the tribes of Central Asia, who have been horsemen from time immemorial, whilst none of the wilder tribes of the Indian peninsula use horses, nor is it probable that the animal is indigenous to the country, the climate of most parts of India being ill-suited for horse-breeding. At the same time it must not be considered as conclusively proved that these pieces of iron are really a bit and stirrups, although the view is probable, especially in the case of the bit.

There is one very striking peculiarity to which I think Mr. Rivett-Carnac has not called attention, but which deserves notice. Mr. Rivett-Carnac has remarked the numerous points in which these circles and the markings upon them shew a connexion with similar remains in Europe. There is, however, one very remarkable distinction. In Europe all such stone monuments as these are classed in the bronze age, the implements of human manufacture found associated being chiefly or entirely of bronze. The occurrence of iron implements in so many cases in India may be due to either of two causes, to the later age of the Indian remains, or to the circumstance that the use of iron was known earlier in India than in Europe. From the extreme paucity of bronze and copper implements in India, it is not improbable that the interval between the time when smoothed stone implements were employed and the discovery of iron was shorter in this country than in Europe, and the relative abundance of iron in Indian tombs may very possibly indicate that the use of the metal was known in India at an earlier period than in Europe.

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## LIBRARY.

The following additions have been made to the Library since the Meeting held in December last.

TRANSACTIONS, PERIODICALS, AND JOURNALS,  
presented by the respective Societies or Editors.

- 
- Berlin. Die Handschriften-Verzeichnisse der Königlichen Bibliothek,—  
Erster Band, 1853.
- Bordeaux. Société de Géographie Commerciale,—Bulletin, Nos. 22, 23.
- Buenos-Aires. La Sociedad Científica Argentina,—Anales, Octubre 1878.
- Lallemant*.—Notas sobre una nueva Relacion entre la Conductibilidad Eléctrica de los metales y sus Caracteres moleculares.
- Calcutta. Mahábhárata,—No. 29.
- Copenhagen. La Société Royale des Antiquaires du Nord,—Mémoires, Nouvelle Série, 1877.
- Dublin. The Royal Irish Academy,—Proceedings, Vol. I, No. 12, Vol. II, Nos. 6, 7, Vol. III, No. 1.
- Vol. III, No. I. *F. O. Ross*.—Myology of the Cheetah, or Hunting Leopard of India (*Felis Jubata*).
- . Transactions, Nov. 1876, March and Augt. 1877.
- March, April, July and Augt. 1878.
- Augt. 1877. *J. Birmingham*.—The Red Stars, Observations and Catalogue.
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     *J. Wood-Mason*.—On new and little-known Mantidæ.  
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     No. 20. *M. Ad. Wurtz*.—La Constitution de la Matière. *M. Hyndman*.—La banqueroute de l'Inde.

## BOOKS AND PAMPHLETS,

*presented by Authors.*

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- WHITE, C. A. Bibliography of North American Invertebrate Paleontology. Pamphlet, 8vo., Washington, 1878.
- WOOD-MASON, J. Description of *Didrepanephorus Bifalcifer*, the type of a new Genus and Species of *Rutelidæ*. Pamphlet, 8vo., London, 1873.

### MISCELLANEOUS PRESENTATIONS.

- BIRDWOOD, G. C. M. A Handbook to the British Indian Section of the Paris Universal Exhibition of 1878.

DEPT. OF REVENUE, AGRICULTURE AND COMMERCE.

- CHAMBERS, F. Brief Sketch of the Meteorology of the Bombay Presidency in 1877.

BOMBAY GOVERNMENT.

- MORRIS, J. H. Report on the Administration of the Central Provinces for the year 1877-78.

CHIEF COMMISSIONER, CENTRAL PROVINCES.

- CORNISH, W. R. Annual Report on Vaccination for the year 1877-78.

MADRAS GOVERNMENT.

- FLEET, J. F. Pāli, Sanskrit, and old Canarese Inscriptions from the Bombay Presidency and parts of the Madras Presidency and Maisūr.

SECRETARY OF STATE FOR INDIA.

- WRIGHT, W. Facsimiles of Ancient Manuscripts, Oriental Series.

THE PALÆOGRAPHICAL SOCIETY.

- BEGLAR, J. D., Archæological Survey of India. Report of a tour through the Bengal Provinces, in 1872-73. Report of a tour in Bundelkhand and Málwa, 1871-72, and in the Central Provinces, 1873-74.

SECY. TO GOVT., HOME DEPT.

### BOOKS PURCHASED.

The life of the Greeks and Romans, described from Antique Monuments. By E. Guhl and W. Koner, translated from the 3rd German Edition by F. Hueffer. 8vo., London.

Cyprus, its Ancient Cities, Tombs and Temples. By General L. P. di Cesnola. 8vo., London, 1877.

The Bayeux Tapestry, reproduced in Autotype Plates, with Historic Notes by F. R. Fowke. London, 1875.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR FEBRUARY, 1879.

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The Annual Meeting of the Asiatic Society of Bengal was held on Wednesday, the 5th of February, 1879 at 9 o'clock P. M.

W. T. BLANFORD, F. R. S., President, in the Chair.

According to the Bye-Laws of the Society, the President ordered the voting papers to be distributed for the election of Officers and Members of Council for 1879, and appointed Drs. King and Cayley, Scrutineers.

The PRESIDENT then called upon the Secretary to read the Annual Report.

ANNUAL REPORT FOR 1878.

In presenting to the Society the customary review of the state and progress of its affairs during the past year, the Council are glad to be again able to report that the condition of the Society is satisfactory, as regards the state of its finances and the interest that continues to be shown in its operations, as evidenced by the accession of members and the number and variety of the communications received for publication.

During the year 1878, 35 new Members joined the Society, a larger number than usual. The losses, by death (9), by retirement (11), and removal (31) amount to 51. The number of Ordinary Members at the close of the year was therefore 327 against 345 in 1877. Of the Ordinary Members 29 are absent from India, so that the effective list now numbers 117 Resident, 153 non-Resident, 15 Foreign and 13 Life Members.

The annexed tabular Statement shows the fluctuation in the number of the Ordinary Members during the past 6 years.

YEAR.	PAYING.				NON-PAYING.		TOTAL.
	Total.	Resident.	Non-resident.	Foreign.	Life.	Absent.	
1873	302	116	186	..	3	53	358
1874	312	127	184	..	3	32	346
1875	292	113	179	..	3	50	345
1876	294	119	175	..	5	48	347
1877	290	113	163	14	9	46	345
1878	260	117	153	15	13	29	327

The diminution in the numbers is apparent rather than real, and is due to the lists having previously included a number of individuals who had virtually ceased to be members, and had for a considerable period abstained from paying subscriptions. All such have now been removed from the list of Members, under Rule 38.

During the year one Member compounded for his subscription, and the free life-membership of the Society was granted to Sir E. C. Bayley and General Thuillier on their retirement from India.

The Society has specially to deplore the loss of Mr. H. Blochmann, who had for many years past so ably filled the post of Philological Secretary, and whose researches into the Ancient History and Geography of Bengal, and more especially his labours in connection with the editing of the text and translation of the *Ain-i-Akbari*, and other Muhammadan historical works, have enriched the pages of the Society's Journal and *Bibliotheca Indica*, and gained for their author a world-wide renown among scholars. It is greatly to be regretted that by Mr. Blochmann's untimely death a great part of the immense wealth of valuable information that he had collected on these subjects has been lost to the world.

Another serious loss to the Society is Mr. S. Kurz, the author of many valuable papers relating to the botany of India and Burma, and by whose early death the Society loses a zealous contributor, and botanical science an experienced and indefatigable worker.

The Society has also to regret the death in England of Dr. T. Oldham, late Superintendent of the Geological Survey, who was on several occasions President of the Society.

The Obituary further includes the names of Mr. A. Anderson, who had contributed several papers on Indian Ornithology to the Society's Journal and other scientific periodicals, Mr. P. T. Carnegy, Mr. T. Chennell, Dr. E. J. Gayer, Mr. C. Heintze, Dr. Verchere, Ordinary Members; M. Garcin de Tassy and Dr. T. Thomson, Honorary Members, and Dr. H. Bleeker, Corresponding Member.



### Indian Museum.

During the past year the Council have received no presentations requiring to be transferred to the Indian Museum under the provisions of Act XXII of 1876. A large number of sculptured stones from the ruins of Buddha Gaya, have, however, been received from Dr. Rájendralála Mitra, Rai Bahádur, C. I. E., which will be transferred to the Museum as soon as a selection has been made from them for the Berlin Museum.

Mr. T. S. Isaac and Capt. J. Waterhouse have continued to act as Trustees on the part of the Society throughout the year. On the vacation of the Presidentship by the Hon'ble Sir E. C. Bayley, K. C. S. I., he was succeeded as ex-officio Trustee by Mr. W. T. Blanford. On the death of Mr. Blochmann, Mr. C. H. Tawney was appointed Trustee, and Mr. H. Beverley took the place of Dr. T. R. Lewis, who went on furlough to Europe.

### Finance.

The Council are glad to be able to report that the financial position of the Society continues in a satisfactory state, and that the accounts of the year show a slight balance of income over expenditure.

The income of the Society from its vested funds will, however, be less in future than it has been during the past year or two, on account of the expiry of the  $5\frac{1}{2}$  per cent. loan, and the consequent transfer of the Government Securities held in that loan to the new  $4\frac{1}{2}$  per cent. loan. This loss of income will necessitate the most careful economy in the administration of the Society's funds, a point to which the attention of the Council will be duly given.

The gross receipts of the Society during the year amount, as shown in the table below, to Rs. 27,284-9-0 and the gross expenditure to Rs. 20,961-9-11. From the balance, Rs. 6,322-15-1, must be deducted Rs. 976-0-0 for admission fees and Rs. 100-0-0 for compounding fees, both which sums were transferred after the close of the year to the Permanent Vested Fund, leaving a balance of Rs. 5,222-15-1 available for the expenditure of the present year.

The gross receipts are larger than they would have been under ordinary circumstances, owing to the Society having received the whole of the interest due on the  $5\frac{1}{2}$  per cent. loan up to its expiry on the 30th April next, amounting to Rs. 10,266-1-5, instead of Rs. 7,308-0-0, the interest due for the year. The difference, Rs. 2,958-1-5, must therefore be considered as part of the income of the current year.

The gross expenditure includes the following items of extraordinary expenditure: under *Publications*, Rs. 928-1-6 remitted to England in advance



for the publication of Mr. Moore's papers on Indian *Lepidoptera* from the collection of the late Mr. C. S. Atkinson. This sum was provided by the sale of Government Securities for Rs. 1,000. Under *Library*, Rs. 1,594-0-0 paid for the preparation of the new Catalogues of Books and MSS. This sum, which should have been met by sale of Government Securities in the Temporary Vested Fund, has actually been paid from current income.

Apart from the interest derived from the vested funds, the ordinary income of the Society shows a further falling off in the two important items of *Subscriptions* and *Publications*, which is to be regretted. The loss is, however, more than made up by an increase in the items of *Library* and *Contingencies*, the increase on the latter head being chiefly the proceeds realised from the sale of the old Museum cases &c.

The receipts from admission and compounding fees amounted to Rs. 1,076-0-0. Rs. 1,100-0-0 have been transferred from the Temporary to the Permanent Vested Fund on this account, and steps will be taken immediately to replace the amount in the Temporary Fund.

At the close of 1877 the outstandings due to the Society for admission fees, subscriptions, sale of publications &c., amounted to Rs. 7,074-5-5. Of this sum Rs. 3,250-9-0 has been written off as irrecoverable. The sum now due from members for arrears of subscriptions &c. amounts to Rs. 2,215-5-0, a great part of which it is hoped may be recovered during the current year.

The net income of the Society amounted to Rs. 20,461-13-9, but from this Rs. 2,958-1-5, the amount of interest received in excess for the half year October to April 1878, should be deducted, leaving a balance of Rs. 17,503-12-4. The ordinary expenditure amounted to Rs. 16,417-15-7. There is thus a balance of Rs. 1,085-12-9 in favour of the Society.

The following is a Statement of the Cash Assets of the Society at the close of 1878:—

Permanent Vested Fund, ...	Rs.	127,800	0	0
Temporary ditto, ...	...	7,200	0	0
Balance in the Bank of Bengal, ...	...	6,265	14	11
Cash in hand, ...	...	57	0	2
Total, Rs.		141,322	15	1

The following tables will show the Gross Receipts and Expenditure of the Society as compared with the previous year, and also the Net Income and Ordinary Expenditure.

## GROSS RECEIPTS.

		1877.	1878.
Balance of 1876, ...	Rs.	3,432 3 5	2,694 13 3
Admission Fees, ...	...	880 0 0	976 0 0
Subscriptions, ...	...	7,200 2 0	7,006 0 0
Publications, ...	...	1,633 5 0	1,340 5 0
Library, ...	...	227 5 0	270 11 0
Fines &c., ...	...	47 7 9	42 11 9
Sale of Government Securities, ...	...	17,501 0 11	1,045 8 0
Interest on Government Securities, ...	...	7,583 0 0	10,226 1 5
Coin Fund, ...	...	17 0 0	0 0 0
Loan from Fund <i>a/c</i> ...	...	1,000 0 0	0 0 0
Do. O. P. Fund, ...	...	0 0 0	2,000 0 0
Do. Cons. MSS., ...	...	0 0 0	6 6 0
Refund of postage, ...	...	1,033 11 0	957 9 10
Compounding Fees, ...	...	770 0 0	100 0 0
Contingencies, ...	...	21 8 0	618 6 9
Total, Rs.		41,346 11 1	27,284 9 0

## GROSS EXPENDITURE.

Publications, ...	Rs.	8,194 15 5	7,652 13 5
Library (Purchase of books &c.), ...	...	3,436 13 9	2,215 6 3
Do. Extra men for Catalogues, ...	...	935 3 0	1,594 0 0
Establishment, Library, ...	...	1,800 0 0	1,497 8 0
Do. Secretary's Office, ...	...	2,191 0 0	2,320 0 0
Secretary's office, Contingencies, ...	...	1,452 15 8	1,201 1 1
Sale of Government Securities, ...	...	78 8 1	3 14 10
Interest of ditto, ...	...	18 15 2	25 8 10
Coin Fund, ...	...	221 10 0	59 8 6
Furniture &c., ...	...	8,125 15 6	620 13 0
Building, ...	...	7,569 13 6	11 4 0
Taxes, ...	...	750 0 0	780 0 0
Loan from Fund <i>a/c</i> ...	...	800 0 0	0 0 0
Do. from O. P. Fund <i>a/c</i> ...	...	1,000 0 0	2,000 0 0
Cons. of Sans. MSS. <i>a/c</i> ...	...	1,000 0 0	6 6 0
Refund of postage, ...	...	1,075 15 9	932 6 0
Copying MSS., ...	...	0 0 0	41 0 0
	Rs.	38,651 13 10	20,961 9 11
Balance, ...	...	2,694 13 3	6,322 15 1
	Rs.	41,346 11 1	27,284 9 0

## NET INCOME.

		1877.	1878.
Subscriptions, ...	Rs.	7,200 2 0	7,006 0 0
Publications, ...	...	1,633 5 0	1,340 5 0
Library, ...	...	227 5 0	270 11 0
Fines &c., ...	...	47 7 9	42 11 9
Interest, ...	...	7,583 0 0	10,226 1 5
Coin Fund, ...	...	17 0 0	0 0 0
Refund of postage, ...	...	1,033 11 0	957 9 10
Contingencies, ...	...	21 8 0	618 6 9
	Rs.	17,763 6 9	20,461 13 9

## ORDINARY EXPENDITURE.

Publications, ...	Rs.	7,623 8 7	6,724 11 11
Library, ...	...	3,436 13 3	2,215 6 3
Establishment, Library, ...	...	1,800 0 0	1,497 8 0
Do. Secretary's office, ...	...	2,191 0 0	2,320 0 0
Interest, ...	...	18 15 2	25 8 10
Contingent charges, ...	...	1,452 15 8	1,201 1 1
Coin Fund, ...	...	221 10 0	59 8 6
Taxes, ...	...	750 0 0	780 0 0
Postage, ...	...	1,075 15 9	932 6 0
Copying MSS., ...	...	0 0 0	41 0 0
Furniture, ...	...	0 0 0	620 13 0
	Rs.	18,570 14 5	16,417 15 7

The following is the estimate for Income and Expenditure during 1879.

## INCOME.

Balance in hand, ...	...	Rs.	5,222 15 0
Subscriptions, ...	...	...	7,000 0 0
Publications and Library, ...	...	...	1,600 0 0
Interest in Vested Funds, ...	...	...	3,235 0 0
		Rs.	17,057 15 0

## EXPENDITURE.

Publications, ...	...	...	Rs.	7,000	0	0
Library, ...	...	...	...	3,000	0	0
Establishment Library, ...	...	...	...	1,500	0	0
Do. Secretary's office, ...	...	...	...	2,500	0	0
Contingencies, ...	...	...	...	1200	0	0
Building, ...	...	...	...	500	0	0
Furniture, ...	...	...	...	300	0	0
Coins, ...	...	...	...	200	0	0
Taxes, ...	...	...	...	780	0	0
				<hr/>		
				Rs.	16,980	0 0
				<hr/>		

**The London Agency.**

Messrs. Trübner and Co.'s yearly statement of accounts with the Society from 1st January to 31st December, 1877 showed a balance of £34-2-1 due from the Society. On subsequent examination, this sum was reduced to £33-16-11 and duly remitted.

According to Messrs. Trübner's statement, the sale of the Society's publications during the year 1877 amounted to Rs. 278-6, and that of the Bibliotheca Indica publications to Rs. 545-10. This sum representing £75-11-6 was placed to the credit of the Society and O. P. Fund respectively.

Twenty-four invoices, consisting of publications of scientific Societies presented to the Society, books purchased and books on inspection, were received from Messrs. Trübner and Co. during 1878. The money value of these consignments amounted to £99-6-11. 335 copies of both Parts of the Journal, and 238 copies of the Proceedings, representing respectively a money value of £61-8-4 and £15-12, were despatched to Messrs. Trübner and Co. for sale. 546 copies of the Bibliotheca Indica publications, valued at Rs. 407-2, were also sent for sale.

**Library.**

The additions to the Library during the past year comprise in all 1,326 volumes or parts of volumes. Of these 677 were received as presentations from Government, from authors, or by exchange, and 649 were purchased.

The new Catalogue of the Library, to which reference was made in last year's Report, progressed as far as completion of the cataloguing in the hands of the late Mr. Blochmann. A heavy work of revision and arrangement has yet to be done before the Catalogue can go to press. Mr. H. B. Medlicott has kindly taken charge of the work, and it is hoped that the current

year will see it through the press. As, however, the Council have to rely entirely upon the gratuitous aid offered by already over-worked officers and Members of Council for the effective supervision of such important works, they trust that delays will be excused.

Arrangements have been made with Messrs. Trübner and Co. for the quick despatch by Overland Parcel Post of the periodicals and Journals supplied to the Society, and these now come in monthly or fortnightly parcels instead of being collected and sent out by the P. and O. Steamers.

#### Publications.

The publications of the Society issued during the year comprise 9 Nos. of the Proceedings, consisting of 188 pages of text with two plates; No. 10, with Index, will be ready immediately. Three Nos. of the Journal, Part I, have been issued containing 257 pages of text, illustrated by 24 plates. Of the Journal, Part II, three Nos. have been issued, consisting of 174 pages of text illustrated by 8 plates (5 coloured). No. 4 is well advanced in the press and will shortly be ready.

The Council hoped that the 1st Part of the Extra Number, containing descriptions by Messrs. Moore and Hewitson of the Indian *Lepidoptera* found in the collections of the late Mr. W. S. Atkinson, would have been ready for distribution during the year. Some delay has, however, occurred in the drawing of the plates, and it is uncertain when the first part will be ready.

#### Building.

The amount expended on repairs to the Society's premises and for furniture during the year has been very trifling, amounting only to Rs. 632.

With reference to the erection of the railing in front of the Society's premises, the Council have decided on having the present wall altered and repaired, as they do not consider it advisable to diminish the funds of the Society further at present. The arrangement the Council had hoped to conclude with the Municipality to give a small strip of land to the latter in exchange for a sum that would have sufficed to pay part of the expense of erecting railings has not been carried out, no acceptable proposal having been made by the Municipality.

#### Coin Cabinet.

The accessions to the Coin Cabinet during 1878 were 2 gold, 6 silver, and 41 copper coins purchased; 5 silver Burmese coins presented by the Trustees of the Phayre Museum, Rangoon; one gold and two silver coins received from the Rajah of Suket through the Foreign Office; and 3 silver and 5 copper coins received from Col. C. Martin.

Mr. James Crawford, C. S. brought to the notice of the Council the desirability of a reference being made to Government on the subject of the Treasure Trove Act, in order that the Society might have a chance of purchasing coins &c., found in different parts of the country. The Council accordingly addressed the Government on the subject, and orders have been issued to the Civil authorities throughout the country to inform the Asiatic Society of all finds of coins within their respective jurisdictions. The consequence is, that the Society is constantly receiving intimations of finds of this kind and has been glad to purchase on several occasions. By more recent orders the Asiatic Society is to inform the Bombay Branch of the Royal Asiatic Society of such finds and *vice versa*.

#### Secretary's Office.

Part I of the Journal was in the hands of the late Philological Secretary, Mr. Blochmann, until his death in July, when Mr. C. H. Tawney kindly undertook the duties of the Philological Secretary as a temporary measure. The Rev. Dr. A. F. Rudolf Hoernle was subsequently appointed permanently Philological Secretary.

Captain Waterhouse has continued to hold the General Secretaryship, and charge of the Proceedings, with the exception of 4 months from July to November when Mr. H. B. Medlicott acted for him.

Part II of the Journal has been in various hands during the year. Mr. Lydekker being appointed Natural History Secretary in the early part of the year, relieved Captain Waterhouse and Mr. Blanford of the charge of it; but on Mr. Lydekker's sudden departure in March, those gentlemen again resumed charge of it. During Captain Waterhouse's absence on leave, Mr. Medlicott took charge and the editorship is now held again by Captain Waterhouse and Mr. Blanford.

The Treasurership was held until March by Mr. H. B. Medlicott, who was relieved by Mr. E. Gay. On Mr. Gay's departure for Bombay in August, Mr. H. Beverley was appointed Treasurer and now holds the office.

Mr. G. S. Leonard resigned his appointment as Assistant Secretary in April and Mr. W. E. Bateman was appointed in his place. Mr. Andrews and Babus Kedarnath Bysack, Ramjiwun Mookerjee and Jadu Bindu Bysack have continued to hold the post of Assistant Librarian, Cashier, Assistant Cashier, and Storekeeper, respectively.

#### Bibliotheca Indica.

The progress made in the publication of oriental works has been entirely satisfactory. Altogether 24 fasciculi have been published, including



portions of 9 different works, and three large and important works have been completed. Of the works published, one is an English translation from the Sanskrit, five in Sanskrit, and three in Persian.

The translation above referred to is an elegant and most accurate rendering of the Aphorisms of Śaṅḍilya with the commentary of Sivapneśvara. The Society is indebted for it to Professor E. B. Cowell. The work is devoted to the Hindu doctrine of faith, and forms the text-book of the Bhakti system, which appears in its most developed form in the Bhāgavata Purāṇa, and in the commentary of Rāmānuja on the Vedānta aphorisms of Vyāsa. In many of its salient points it is closely related to the doctrine of the Sūfis. The cardinal principle which the author of the work upholds is, that "knowledge is only the hand-maid of faith and not, as contended by the Hindu gnostics, the only thing needful." The Sanskrit text was originally undertaken by the late Dr. Ballantyne, and on his retirement from India when half of the work had been printed, was completed for the Society by Mr. Griffith, in 1861.

Of the Sanskrit works, the most important is the Sañhitā of the Sāma Veda. It comprises four different works, namely, Grāmageya Gāna, the Uha Gāna, Uha Gāna and Āraṇya Gāna. These include all the hymns of the Sāma Veda set to music. Inasmuch, however, as the hymns with their musical notations were perfectly unintelligible, the words of the hymns were early separated into a distinct compilation called "Ārchika; or the Richas of the Rig Veda, occurring in the Sāma Veda". This last was commented upon by Śāyana. A recension of this compilation was published by the Oriental Translation Fund of London, in 1842, and another by Dr. Benfey in 1848. Both appeared under the name of the Sañhitā of the Sāma Veda; but as they did not include those peculiarities which convert Rig verses into Sāma hymns, they were, in the form in which they appeared, not Sāmas but Rig verses. The Society undertook, in 1870, an edition of the Sāma hymns, and it has now been completed in 5 volumes. The Rig collection has been adopted as the basis, and to every verse of it have been added all the various transformations which it has undergone in changing from the Rig to the Sāma,—including all the musical notations, as also the commentary of Śāyana on the text. Thus practically the Society's edition comprises six different works, namely, the Ārchika, the four Gānas and the commentary of Śāyana, and the bulk of the edition has necessarily been greatly increased thereby; but it is hoped that it will afford to oriental scholars the most complete edition of the Sāma Sañhitā. The plan adopted has in some places disturbed the order in which the Gānas appear in their respective collections; but this was unavoidable. To remedy the defect full indexes have been supplied at the beginning of each volume. The Council have great

pleasure in adding that the editor, Paṇḍit Satyavrata Sāmaśramī, has completed the work with commendable zeal, ability and care.

The Agni Purāṇa was taken in hand in 1871 by the late Paṇḍit Harāmohan Tarkabhūṣṇa; but it was stopped after the publication of two fasci-  
culi. Dr. Rājendralāla Mitra has now completed it in three volumes. The work forms a Cyclopædia of Sanskrit literature, and has been printed from nine different MSS., one of which was obtained from Bombay, one from Tanjore, two from Benares and five from different sources in Bengal.

Of the Society's edition of Hemādri's Chaturvarga Chintāmaṇi, seven fasci-  
culi have been published during the period under report. Four more will complete the second volume, and with it the work will for the present be concluded, as it has not been possible to procure sufficient materials for the remaining 3 volumes.

Paṇḍit Bāla Śāstrī of the Benares College has brought out the sixth fasci-  
culus of the Bhāmati. It is expected that the work will be completed in the course of the current year. Paṇḍit Chandrakānta Tarkaratna's edition of the Gobhiliya Gṛihya Sūtra is also expected to be completed in a short time. The whole of the text has been printed, and two short appendices are now in the hands of the printer.

The Rev. Dr. Hoernle's edition of the *Prithvirāja Rāyasā* has advanced by one fasci-  
culus. The work is a large one, and it will be some time before it can be brought to a conclusion.

The Persian series has sustained a serious loss by the death of Mr. H. Blochmann. Under his able superintendence it was progressing in a most satisfactory manner, and the Council doubt if they will be able to replace him for a long time to come. A little before his death, he had completed the second volume of the text of the *Ain-i-Akbari*, which is a large 4to. of nearly a thousand pages, got up in a manner that leaves nothing to be desired. Annexed to the volume is an interesting biography of the author, in English. It is to be regretted that the untimely death of the learned editor has deprived the public of the chance of obtaining an English translation of this portion of the work from his pen. An impression appears to exist both in this country and in Europe, that the late Mr. Blochmann before his death had completed this translation. The Council have, however, had a most diligent search made for the MS., but without finding the least trace of it or any allusion to it in Mr. Blochmann's papers, and are therefore inclined to believe that the translation was not completed, and that a confusion has arisen between the completion of the text and translation.

Maulavī 'Abdur Rāhīm has advanced the Society's edition of the *Akbarnāmah* by one fasci-  
culus, and has also brought out an Index of names of persons and places occurring in the first volume of the work.



The following is a list of the number of fasciuli published during the past year.

*Sanskrit Series.*

1. CHATURYARGA CHINTÁMAṆI, by Hemádri, edited by Paṇḍit Bharatachandra Śiromaṇi. Nos. 391, 400, 401, 403, 406, 407, 410, Vol. II, Pt. II, Fasc. XIII, and Vol. II, P. II, Fasc. I to VI.

2. SÁMA VEDA SAÑHITÁ, with the commentary of Sáyana Áchárya, edited by Paṇḍit Satyávrata Sámāśramí. Nos. 376, 382, 385, 389, 398, 402 413, 414. Vol. V, Fasc. I to VIII.

3. AGNI PURÁṆA, a system of Hindu Mythology and Tradition, edited by Dr. Rájendralála Mitra, C. I. E. Nos. 399, 404, Fasc. XII and XIII.

4. BHÁMATI, a Gloss on Sañkara Áchárya's commentary on the Brahma Sútras, by Váchaspati Mísra, edited by Paṇḍit Bála Sástrí. No. 405, Fasc. VI.

5. PRITHÍRÁJA RÁSAYASÁ of Chand Baradi, edited by the Rev. A. F. R. Hoernle, Ph. D. No. 408, P. II, Fasc. II.

6. The APHORISMS OF SÁNDÍLYA with the commentary of Svapneśvara, of the Hindu Doctrine of faith, translated by E. B. Cowell, M. A. No. 409.

*Arabic and Persian Series.*

7. AÍN-I-AKBARÍ, by Abul-Fazl-i-Mubárák-i-'Allámí, edited by H. Blochmann, M. A. Fasc. XVII.

8. AKBAR-NÁMAH, by Abul-Fazl-i-Mubárák-i-'Allámí, edited by Maulawí 'Abdur Rahím, Calcutta Madrasah. Nos. 411 and 412, Vol. II, Fasc. III.

9. Index of Names of Persons and Geographical Names occurring in the Akbar-námah, Vol. I, by Abul-Fazl-i-Mubárák-i 'Allámí, edited by Maulawí 'Abdur Rahím.

*List of Societies and Institutions with which Exchanges of Publications have been made during 1878.*

Batavia :—Batavian Society of Arts and Sciences.

Birmingham :—Institution of Mechanical Engineers.

Bombay :—Bombay Branch, Royal Asiatic Society.

——— :—Editor, Indian Antiquary.

Boston :—Natural History Society.

Bordeaux :—Bordeaux Academy.

Buenos Ayres :—Public Museum.

Brussels :—Royal Academy of Sciences.

——— :—Geological Society of Belgium.

- Calcutta :—Agricultural and Horticultural Society of India.  
—— :—Geological Survey of India.  
Cherbourg :—National Society of Natural Science.  
Christiana :—University Library.  
Copenhagen :—Royal Society of Northern Antiquaries.  
Cambridge :—University Library.  
Colombo :—Royal Asiatic Society, Ceylon Branch.  
California :—Californian Academy of Arts and Sciences.  
Dehra-Dun :—Great Trigonometrical Survey.  
Dublin :—Royal Irish Academy.  
—— :—Natural History Society.  
Edinburgh :—Royal Society.  
Frankfort :—Natural History Society.  
Geneva :—Physical and Natural History Society.  
Genoa :—Museum of Natural History.  
Königsberg :—Physical and Economical Institution.  
Leipzig :—German Oriental Society.  
Liège :—Royal Society of Sciences.  
Liverpool :—Literary and Philosophical Society.  
London :—Royal Society.  
—— :—British Museum.  
—— :—Royal Asiatic Society of Great Britain and Ireland.  
—— :—Royal Institution.  
—— :—Institution of Civil Engineers.  
—— :—Royal Geographical Society.  
—— :—Museum of Practical Geology.  
—— :—Zoological Society.  
—— :—Statistical Society.  
—— :—Geological Society.  
—— :—Linnean Society.  
—— :—Anthropological Institute.  
—— :—Royal Astronomical Society.  
—— :—Editor, Athenæum.  
—— :—Editor, Geographical Magazine.  
—— :—Editor, Nature.  
—— :—Society of Telegraph Engineers.  
Lyon :—Agricultural Society.  
—— :—Museum of Natural History.  
Madras :—Literary Society.  
Manchester :—Literary and Philosophical Society.  
Munich :—Royal Academy.  
Netherlands :—Royal Society.  
New Haven, U. S. :—Connecticut Academy of Arts and Sciences.

- New South Wales :—Royal Society.  
 Oxford :—Bodleian Library.  
 Paris :—Imperial Library.  
 — :—Anthropological Society.  
 — :—Asiatic Society.  
 — :—Geographical Society.  
 — :—Ethnological Society.  
 — :—Zoological Society.  
 Pisa :—Tuscan Society of Natural Sciences.  
 Stettin :—Entomological Society.  
 Stuttgart :—Natural History Society of Wurtemberg.  
 St. Petersburg :—Imperial Library.  
 — :—Imperial Russian Geographical Society.  
 — :—Imperial Academy of Sciences.  
 Stockholm :—Royal Academy of Sciences.  
 Trieste :—Academy.  
 United States, America :—Geological Survey of the Territories.  
 Vienna :—Imperial Geological Institute.  
 — :—Anthropological Society.  
 — :—Imperial Academy of Sciences.  
 — :—Zoological Society.  
 Washington :—Smithsonian Institution.  
 — :—Commissioners of the Department of Agriculture.  
 Yokohama :—German Oriental Society.  
 — :—Asiatic Society of Japan.

#### ABSTRACT OF PROCEEDINGS OF THE COUNCIL DURING 1878.

##### *January 30th, Ordinary Meeting.*

A letter was read from the Assistant Secretary, Government of Bengal, forwarding a letter from the Home Department, Government of India, No. 12, dated 3rd January, 1878, stating, with reference to the Society's letter, No. 487, dated 8th August, 1876, that the Governor-General in Council accepts Dr. Rājendralāla Mitra's offer to prepare an abstract of Harish Chandra Shastri's Analytical Catalogue of Sanskrit Books in the possession of the Maharaja of Bikanir at a cost not exceeding Rs. 5000.

The letter was ordered to be recorded.

##### *February 28th, Ordinary Meeting.*

An application for an exchange of publications with the Society of Telegraph Engineers was sanctioned.

A copy of Scudder's Catalogue of Scientific Series was ordered to be subscribed for.

A recommendation of the Finance Committee, with reference to an application from Dr. Rājendralāla Mitra for a grant of Rs. 360 for the General Catalogue of the Society's Sanskrit MSS. and Rs. 340 for the cataloguing of the Hodgson MSS., that the latter should be sanctioned, but that the expense for an additional pundit for the former could not be afforded at present, was approved.

On the recommendation of the Secretary, it was ordered that the Society's publications should be sent direct by post to the Royal, Geological, Zoological, and Royal Asiatic Societies in London.

It was ordered that £80 should be remitted to Mr. Grote to meet the expenses of publishing Part I of the descriptions by Messrs. Moore and Hewitson of *Lepidoptera* in the collection of the late Mr. W. S. Atkinson.

With reference to a communication from Mr. J. Crawford, C. S., on the subject of the Treasure Trove Bill, it was ordered that the Government be asked that the Society may be allowed to purchase duplicates of such coins as the Government do not require for their own purposes at the price paid by the Government.

*March 28th, Ordinary Meeting.*

It was ordered that the publications of the Society should be sent by post direct to the Oriental Society of Leipzig and the Asiatic Society of Paris.

*April 25th, Ordinary Meeting.*

A Committee composed of the President, Dr. Rājendralāla Mitra, the Hon J. O'Kinealy, T. S. Isaac, Esq. and Capt. J. Waterhouse, was appointed to meet Mr. Metcalfe, and discuss the question of the boundary railings.

An application from the Geographical Society of Halle for an exchange of publications was declined.

A similar application from the Société Imperiale des Amis d' Histoire Naturelle, d' Anthropologie et d' Ethnographie, of Moscow, was also declined on the ground that the publications were believed to be in Russian.

The question of publishing an Index to Vols. 24 to 46 of the Society's Journal, compiled by Mr. G. S. Leonard, Assistant Secretary of the Society, was considered, and it was ordered that if Mr. Leonard will publish the work on his own responsibility, the Society will take copies to the value of Rs. 500 for distribution.

*May 30th, Ordinary Meeting.*

An exchange of Part II of the Society's Journal for the Archives of the Museum d' Histoire Naturelle de Lyon was accepted.

An exchange of publications with the Royal Society of New South Wales was sanctioned.

The new rules for the Library, drawn up by the Secretary, were approved, with a few modifications.

*June 27th, Ordinary Meeting.*

With reference to the question of a new boundary railing, it was finally decided that as no satisfactory offer had been received from the Municipality, the present wall should be altered and repaired after the rains.

A recommendation of the Finance Committee that Rs 1000 worth of Government Securities should be sold to meet the expense of the Atkinson papers was sanctioned.

*August 1st, Ordinary Meeting.*

Mr. H. Blochmann having resigned the Trusteeship of the Indian Museum, Mr. E. Gay was appointed a Trustee on behalf of the Society.

The following minute was recorded on the death of Mr. H. Blochmann, Philological Secretary of the Society.

"The Council desires to place on record its sense of the very great loss that the Society and Oriental literature have sustained in the death of Mr. Blochmann, and to express its deep regret at the sad event that has deprived the members of so valuable and estimable a colleague."

Mr. C. H. Tawney was appointed Philological Secretary temporarily.

Mr. E. Gay having resigned the Treasurership on his departure for Bombay, Mr. H. Beverley was appointed in his place.

Applications from the Industrial School of Distritz and the United Service Institution of India for an exchange of publications were declined.

A Committee composed of Messrs. O'Kinealy, Croft, Dr. R. L. Mitra, Babu Prannath Pandit, the President and Secretaries was appointed to collect subscriptions for a memorial to the late Mr. Blochmann.

*August 29th, Ordinary Meeting.*

Mr. C. H. Tawney was appointed a Trustee of the Indian Museum in place of Mr. E. Gay.

The recommendation of the Finance Committee that the Society's  $5\frac{1}{2}$  per cent. Government Securities should be transferred to  $4\frac{1}{2}$ , was approved and confirmed, and the Treasurer ordered to effect the transfer.

An offer from Mr. C. J. Lyall to continue the editing and publishing of the Persian text of 'Amar Khayyám was accepted with thanks.

*September 25th, Ordinary Meeting.*

In reply to a letter from the Society of Telegraph Engineers a copy of the Ronald's Catalogue was ordered to be subscribed for.

Read a letter No. 200, dated 31st August, from the Under-Secretary to the Government of Bengal, stating that the Lieutenant-Governor approves of the manner in which the Government grant for cataloguing Sanskrit MSS. had been applied.

Mr. H. Beverley was appointed a Trustee of the Indian Museum in place of Dr. T. R. Lewis, resigned on leaving India.

*October 31st, Ordinary Meeting.*

The publication of Lieut. R. Temple's Grammar of the S. Andaman language was declined from want of funds.

*November 28th, Ordinary Meeting.*

In reply to a letter from Messrs. Newman and Co., asking if the Society had promised to take copies of Mr. Leonard's Index to the Journal, they were ordered to be informed that if the Index were published, the Society would be prepared to take copies to the value of Rs. 500, provided it meets with the approval of the Council.

The Mali and Bearer were ordered to receive a temporary increase of 1 Rupee each per mensem for November and December.

The PRESIDENT then delivered the following address—

PRESIDENT'S ADDRESS.

The close of the period for which you have done me the honour of entrusting me with the Presidency of your Society brings with it the occasion of reviewing briefly some of the incidents of the past year, and of offering a few remarks on some of the scientific questions which have from time to time attracted the attention of our members. In the great Societies of Europe, where the subjects discussed are of cosmopolitan interest, it is not an unusual proceeding to review the progress of human thought generally or of the particular branch to which each Society devotes itself, during the course of the preceding twelve months, but situated as we are, at a distance from the greater centres of scientific activity, we shall best do service to the general cause by confining ourselves to the area of the continent from which our Society derives its name, and more especially to the country in which we live.

To review the various discoveries made during the year, and to afford anything like an adequate sketch of their scope and meaning, is indeed a task far beyond the powers of any individual. The year commenced with that marvellous triumph of mechanical resource, the liquefaction, simultaneously and independently by two different chemists, of the only gases which had hitherto resisted all attempts to induce them to change their gaseous state, and terminated with Mr. Norman Lockyer's spectroscopic analyses of the metals, analyses so singular as to have led to the announcement, more sensational than accurate, that the decomposition of bodies hitherto supposed to be elementary had been effected, and even in the columns of newspapers to the suggestion that the old alchemist's dream of transmutation had come true. Great additions have been made in the course of the



twelvemonth to the remarkable series of discoveries of which the telephone was the first-fruits and the phonograph and microphone some of the results, and in astronomy one if not two planets have been shewn to exist, on far more satisfactory evidence than any previously existing, within the orbit of Mercury. There has been no lack of scientific energy, and the results have been in proportion to the labour, the correspondence between power expended and work done holding good in mental as in material dynamics. In Europe and America, where the workers are many, the advance in scientific thought is great. Here in British India and its dependencies, the labourers are comparatively few, and the results are consequently small, but it will be well to pass some of these briefly in review, and try to ascertain what the labours of the year have added to our knowledge.

There is one feature in which almost all scientific work in India differs from that in Europe and America, and especially from the work done in the British Islands and in the United States. In the west nearly all that is effected is due to the labour, entirely spontaneous, and for by far the greater part unremunerated, of private individuals, or of associations like our own; very little is due to the initiation of the ruling power, however willing the Government may be, in some cases, to aid and extend exploration already commenced. In India, although Societies like the Asiatic are not directly subordinate to the Government of the country, by far the larger proportion of our members are officers of the Government, and, in many cases, are officially engaged in scientific enquiries. Hence no small portion of the scientific work of the year, instead of being due to private research, is the result of investigations made for the Government of the country by its own officials, and consequently a review of the year must deal largely with national rather than individual undertakings.

To the members of the Asiatic Society, and especially to those resident in Calcutta, perhaps the most interesting incident of the past year has been the opening of the new Indian Museum. The ornithological and reptilian and the archæological galleries were thrown open to the public on the 1st April, and the mammalian gallery in December. The collection of specimens in spirit is arranged in cases and nearly ready for exhibition, and a portion of the beautiful Buddhist railing from Bharahut has been set up in the archæological gallery in the room to the south of the entrance. Very much still remains to be done; the ethnological collection has not yet been provided with cases, although arrangements have been made by the Trustees to meet the expense, and the archæological collection, almost entirely transferred from the Society, is still unarranged and unprovided with stands; but for this also provision has been made by the Government. But seeing the progress that has already been made, and considering how great has been the labour necessary, I think that very much has been accomplished



by Dr. Anderson, the superintendent, and by his staff of assistants, especially by the taxidermists' department under Mr. Fraser, in the course of the last year. To the members of the Society it must be a source of gratification to see the superb collections made by themselves and their predecessors fairly exhibited in well-lighted galleries, instead of being hidden in small rooms, as they formerly were, and the value of the collections can be much better appreciated since it has been possible to see and examine them.

The geological galleries at the Museum, which were finally opened to the public from the 1st of January, 1878, had been ready for exhibition for some time before, and even temporarily thrown open, but they required much less preparation, and more superintendence was available, amongst the officers of the Geological Survey, for the important work of arrangement. Although the Society's specimens form a much smaller element of the geological than of the zoological, archæological, and ethnological collections, no unimportant part, both of the fossils and minerals, was the property of our association, the most valuable amongst the specimens derived from the Asiatic Society being probably the Siwalik mammalian remains, and the series of meteorites, both of which occupy a conspicuous position in the new galleries.

The Zoological Gardens of Calcutta continue to flourish, and although, like other gardens of the same class, they are rather adapted for recreation than for study, it is a question whether this is not an advantage, for the number of students is so limited in India, that education is needed more than opportunities for original investigation. Several rare Indian animals have already been exhibited, and it is to be hoped that the number will be increased.

Passing now from the more local subjects of interest and turning to those of wider scope; first and foremost of all research in India, as the ground-work upon which so many other sciences depend, is our knowledge of the topography of the country and of neighbouring regions. The first branch of enquiry progresses satisfactorily in the hands of General Walker, and his able assistants of the trigonometrical and topographical surveys, and if the second is still far from what we could desire, some advance has been made, thanks to the officers of the same survey. Some important progress, to which I will refer presently, has been achieved in trans-frontier exploration, and almost the only scientific use hitherto made of the Afghan expedition has been the extension of geographical surveying.

But it is impossible not to regret that our present information is not wider. It is difficult to cast a glance over the map of India and not be struck by the hard sharp line that divides, on so many of our frontiers, the known from the unknown. Despite the new treaty with China, Tibet

is still forbidden ground, and apparently awaits the advent of Colonel Prejevalski, or some other adventurous traveller from the distant regions of Northern Asia, to trace out the upper waters of the rivers that irrigate British India. We can but hope that it will not long remain a national reproach to us that we have less knowledge of the rivers of India than of those of Africa, and that the sources of the Nile and Congo have been explored before those of the Brahmaputra and Irawadi. There is no lack of willing and able explorers, but as the opposition in this case comes not from savage tribes or individuals, but from a fairly civilized Government, it can only be overcome by the action of the ruling power in India. There is no subject at the present time in which more general interest is taken than in the progress of geographical exploration. That there are difficulties in the road of research is unquestionable, but whatever may be the case in politics, it is certain that difficulties in science are not conquered by 'masterly inactivity.'

It is not likely that Tibet will long remain untrodden by European feet. Colonel Prejevalski, far from being discouraged by his two previous failures, failures, however, which have contributed more to our knowledge of Central Asia than any other recent travels, is again about to set out for Lhasa. Nor is he the only traveller who is endeavouring to reach the centre of Mongolian Buddhism, for an Austrian, Count Szechenyi, is about to leave Peking for Tibet under peculiarly favourable conditions. But we hear of no British exploration, and we can only regret that the Government of Great Britain appears desirous of leaving the examination of countries almost within sight of its own mountains to Russian or German travellers. It is impossible that the inhabitants of the country should not contrast Russian energy with British apathy, and the result can scarcely be favourable to the diplomatic reputation of our own Government.

Although Tibet has not been explored nor even entered by any European, something has again been added to our knowledge of its geography by the employment of trained natives, and a step in advance has been made by the determination of the quantity of water passing down the different Assam rivers in the dry season, for the purpose of ascertaining which receives the drainage of the Tibetan plateau. The measurements have been made by Lieut. Harman, R. E., of the Great Trigonometrical Survey, and serve to shew clearly that the Tibetan river cannot be the Subansiri, and that it is probably the Dihong. I have just been informed by Genl. Walker that a native sent by Lieut. Harman to Tibet for the purpose of endeavouring to trace the Sanpo to the eastward, had returned after having followed the river to a point where its course turned southward nearly north of the spot where the Dihong emerges from the mountains into the Assam valley.

All therefore tends so far to support the view taken by the officers in the Great Trigonometrical Survey, and to shew that the Sanpo and Dihong are identical. At the same time the question cannot be considered settled until the two rivers are actually traced into connection with each other.

We may hope for large additions to our knowledge of Afghanistan from the present expedition. I regret to say that hitherto the endeavour to take advantage of the presence of a British army in Afghanistan for purposes of scientific enquiry has been limited to the despatch of surveying parties, but I hope this will not continue to be the case, and that so favourable an opportunity for extending our knowledge of the Archæology of a most interesting region, and for examining the Ethnology, Geology, Zoology and Botany of Afghanistan, will not again be allowed to pass away without being used. I am indebted to General Walker for the information that Major Tanner of the Survey Department has discovered, near Jellalabád, some relics of the old Káfir (pre-Muhammadan) rulers, and more particularly has found a subterranean palace, which has been already partially excavated. He has also made enquiries about those mysterious people, the inhabitants of Káfiristán, and finds that there are at least ten dialects of the Káfir language: of these dialects which, as might be supposed, are Aryan, he is making a glossary. It is greatly to be hoped that Major Tanner will succeed in visiting Káfiristán, a region which has for so long been an object of interest and enquiry, and which was strangely neglected when formerly access was possible. It is not probable that there will be much difficulty in going thither, as the inhabitants are believed to be friendly, and tried to induce English officers to visit them during the former occupation of Cabul.

On some of the other land frontiers of India good progress is being made in the work of surveying. In Burma and Assam, where the difficulties caused by dense forest, one of the worst enemies a surveyor can meet, are at their maximum, there is a steady advance in the triangulation.

The regular work of the Trigonometrical Survey has but little general interest, although it is laying the ground-work for every variety of knowledge, and the details of topography are even less exciting, but the Survey is certainly to be congratulated on the production of maps such as those of Guzerat. Scarcely any one in the country has so good opportunities of testing the accuracy of map-drawing as have the officers of the Geological Survey, and the maps of Kattywar on the scale of an inch to the mile are described as excellent.

But, besides exploration and mapping, there are several branches of scientific enquiry on which the officers of the Great Trigonometrical Survey are engaged. One of these,—a question of far greater practical importance that it appears at first sight,—is the determination of the exact differences

in longitude between distant countries, and especially between England and India, by means of the electric telegraph. This has resulted in the correction of the longitude of Madras, previously ascertained by very long and tedious astronomical observations, extending over many years, by 31.8 seconds of time or rather more than half a mile of distance in this latitude. No addition has been made during the past year to the work described in the Report of the Survey for 1876-77, both the officers engaged, Major Campbell and Captain Heaviside, having been absent on furlough. Another question to which much labour has been devoted by the Survey is the establishment of bench-marks throughout several parts of the country by means of careful spirit-levelling. The vast importance of such marks for engineering works and especially for all plans of irrigation is manifest, and it is not improbable that the scientific importance of the levels will increase greatly, as, in connection with a series of other observations at tidal stations, they will afford data for determining whether changes in the elevation of land are taking place in different parts of the country.

Amongst the numerous subjects to which the officers of the Trigonometrical Survey have directed their attention, some of great interest have been described, at Genl. Walker's suggestion, in the Journal of the Society for the past year, and it may fairly be hoped that the publication, in this form, of observations such as those made for the purpose of determining the mean sea-level in the Gulf of Cutch, may serve the purpose of making the results more widely known than if they were recorded only in an official report, whilst the Journal of the Society gains in interest and value by being made the medium of publication. The paper by Lieut. Harman, to which I have already alluded, on the results of measurements of the Assam rivers, will, I hope, be read this evening.

Few plans for recording the advancement of any enquiry are more trustworthy than a comparison of the methods employed in delineating the results: careful observations require for their record neat and accurate drawing, and facility of reproduction. Thus the account given by Captain Waterhouse in our Journal of the various photographic methods employed in the reproduction of maps and plans, whilst dealing solely with the art of map printing, shews indirectly the great advance of the science of Geography in India, and the demand for more accurate knowledge of the surface of the country. The progress of the whole art of Government in India during the last thirty years, and the change from comparative ignorance to more accurate knowledge, could not be better illustrated than by a comparison of the maps produced at the commencement of the period, and those now issued, and it may safely be asserted that the increase in the accuracy of the maps is at least equal to the improvement in map printing.

The work of the Marine Survey under Captain Taylor, I. N., is still greatly restricted by the want of a proper vessel, and until the steamer now being built at Bombay is completed, it is not possible that any important additions can be made to our knowledge of the Indian seas. Meantime, however, some most useful charts have been published, and several harbours, roadsteads, and tracts of the coast have been surveyed. For a knowledge of the true contour of the sea bottom in the neighbourhood of India, and for the investigation of all the interesting problems in geology and zoology that may be solved by means of the sounding line and dredge, we must still wait for the new vessel, which I am happy to say will be fully provided with the necessary apparatus, and which, in the hands of Captain Taylor and Lieut. Jarrad, may be expected to add to the magnificent series of discoveries due to the "Challenger" expedition. The seas of India are as yet untouched, and as the country itself has had a peculiar and exceptional geological history, it is not improbable that the depths of the surrounding ocean may harbour many forms of life not existing in the other oceanic tracts. Some of those curious questions as to the course of the great oceanic currents, questions upon which, undoubtedly, the distribution of temperature and rainfall largely depends, may receive their solution in an area where access from one polar region is entirely barred, and thus the conflicting effect of two sources of cold water is not present, as in the Atlantic and Pacific Oceans, to disturb the observations made.

The subject of deep-sea dredging is one to which the attention of the Society was first directed several years since, and the Council has never ceased to urge the importance of it. It may be hoped that there is at last a prospect of useful exploration. For geological purposes and for comparison with the marine fossils of the tertiary formations, a series of the invertebrata and especially of the mollusca, echinoderms and corals of the Indian seas is essential, and for much aid in obtaining such a collection we look to the Marine Survey.

The field work of the Geological Survey for the past year has not been very prolific in results of interest, and, as in the larger field of the Trigonometrical Survey, the importance of the work is due chiefly to its being part of a connected system. Some valuable additions have been made to our knowledge of Káshmir, Hazára, Bannú and some other portions of the Punjab, Kumaun, Rájputána, Chutia Nágpúr, Kattywar, the Godávári valley, Tanjore and the islands of Rámri and Cheduba, but in no case are the details such as greatly to alter the conclusions previously formed. The only published number of the "Memoirs of the Geological Survey" contains a paper by Mr. Ball on some previously unexplored coal-fields in Palamau (Palamow), and of this paper the interest is rather practical than scientific, although some interesting details are given as to the distribution of certain lower Gondwá-

na formations beyond the Damuda valley, to which they were previously supposed to be restricted. A much longer and more important paper by Mr. Wynne on the Salt Range of the Punjab would have appeared, but for delay in the preparation of maps. All the principal facts and conclusions in this memoir had, however, been published previously in short notes contained in the 'Records of the Geological Survey' and elsewhere.

The 'Records' for the past year exceed the 'Memoirs' both in bulk and in importance, and several of the papers add materially to the knowledge previously existing. Perhaps the most important in their bearing upon physical geology are Mr. Lydekker's and Colonel McMahon's contributions to the geology of the north-west Himalayas. Many circumstances have concurred to delay the geological examination of the Himalayan chain, and thus it has happened that Káshmir, which, it might have been thought, would have attracted the earliest attention from the Geological Survey, has remained so long imperfectly known. For what has hitherto been ascertained we are chiefly indebted to Col. Godwin-Austen and the late Dr. Verchere, for although an excellent geologist, Mr. Drew, was for years resident in the country, in the service of the Mahárája, he was prevented by his official position from publishing the observations he made, and his opportunities of examining the country were much restricted.

Mr. Lydekker has now traced several points of connexion between the series of formations determined by Dr. Stoliczka in Spiti, Rupshu and Ladák, and the rocks of Káshmir, Kishtwár and Pángi, and has in some cases modified the conclusions formerly arrived at, especially with regard to the very complicated relations of the metamorphic rocks. There is still much to be done before the relative ages of the latter are determined with certainty, but it seems clear that gneissic rocks of two different systems, distinct both in origin and in period of metamorphism, exist both in Káshmir and Ladák, that the slates and bedded volcanic rocks, so abundantly developed both north and south of the Káshmir valley, are of older palæozoic age, and although they have hitherto proved unfossiliferous, that they must be considered to represent the Silurians of Spiti and Hundes, and that all the different limestones of the Pir Panjál range, including the great bed of the Jamu hills, are probably carboniferous, like the fossiliferous limestones of the Káshmir valley.

Not the least interesting of Mr. Lydekker's observations refer to the physical structure of the mountains. He has shewn that the Káshmir valley is a compressed synclinal ellipse, and consequently similar in its main features to the area already described by Dr. Stoliczka further to the eastward in Spiti and Ladák, although in the latter region newer rocks appear than are found in Káshmir, where the highest beds occurring are triassic. The Pir Panjál range, to the south of the Káshmir valley, is shewn to be a



great anticlinal flexure, with all the beds on the southern side inverted, as they so commonly are along the southern base of the Himalayas. A smaller synclinal ellipse occurs south-east of Káshmir on the upper Chináb in the Pángi district. To all these facts attention has been especially directed by Mr. Medlicott, the Superintendent of the Geological Survey, in his annual report for 1877, and he notices especially how the recurrence, in the north-western Himalayas, of a series of synclinal ellipses, formed of sedimentary beds and having their longer axes parallel with the main direction of the mountain range—each ellipse being isolated from the others by intervening ranges of metamorphics,—tends to shew that the different basins were all originally part of one sedimentary area, and that their present isolation is due to disturbance and denudation. Nevertheless some subsequent observations to the north of Simla are in favour of partial separation in early palæozoic times having subsisted between the two important sedimentary tracts of Spiti and Hundes.

Colonel McMahon's paper on the rocks of the Simla area was published in 1877, but it has been supplemented by another, now in the press, on the Central Himalayan region to the north of Simla. These contributions to the geology of the Himalayas are deserving of more than a passing notice. It is but rarely in India that any one beyond the limit of the Geological Survey possesses both the inclination and the opportunity to investigate the geology of the country, and it may be added that the physical geology of the Indian Peninsula in general is chiefly remarkable for monotony and want of interest. When a new observer arises amongst us and proves himself not only able but willing to examine such very difficult problems as those presented by the complicated formations of the Himalayas, all interested in geology must welcome so valuable an addition to our strength. One of the greatest drawbacks to scientific progress in this country is the want of external criticism, and the worthlessness of much of such criticism as is offered; too frequently it happens that such remarks as appear, whether laudatory or adverse, serve chiefly to shew the ignorance of the critic. Hence arises a professional intolerance of criticism, and a disposition to dogmatize. Had we but a few more independent observers like Colonel McMahon, the progress of Indian geology would be far more rapid.

There are few tracts in the Himalaya more puzzling than the Simla area. North of the Sutlej lies the great band of ancient metamorphic rocks, called the Central Gneiss by Stoliczka, and beyond this again to the northward is the great sedimentary series of the Spiti valley, containing marine fossiliferous rocks of silurian, carboniferous, jurassic, triassic and cretaceous age, the lowest of which beds form the peaks of the snowy range. South of the band of central gneiss none of these fossiliferous rocks have been



found, but a series of sedimentary beds occur, long since classed and described by Mr. H. B. Medlicott, in descending sequence, as Krol, Infra-Krol, Blaini, and Infra-Blaini. With these sedimentary beds gneiss is associated, and two difficulties have hitherto attended all attempts at determining the position and relations of the Simla rocks; the first being that the sedimentary beds, in places, appear to be distinctly lower in position than the gneiss, and the second that no clear connexion can be traced between the sedimentary unfossiliferous beds to the south of the snowy range, and the fossiliferous series to the north. Stoliczka considered that the gneiss of Simla was newer than the central gneiss, and that the Krol limestone, the most characteristic bed of the Simla area, represented the Lilang triassic limestone of Spiti. Mr. Lydekker suggested on the other hand that the Krol limestone was probably the same as that of the Pir Panjál, and consequently carboniferous. Col. McMahon confirms Stoliczka's views as to the resemblance between the Krol and Lilang limestones, but has shewn, on what appears to be clear evidence, that the gneiss of Simla and the 'Central Gneiss' are identical, and that the apparent superposition of the gneissic rocks on the sedimentary series near Simla is due to the original deposition of the latter in valleys or other hollows worn out of the surface of the former, and to the subsequent great compression of the whole area, and partial metamorphism of the sedimentary rocks. These views, worked out with much care, suggest a similar explanation of those singularly anomalous sections in Sikkim in which, as Mr. Mallet has shewn, there appears, on all sides of the mass of hills around Darjiling, to be a gradual passage in an ascending section from unaltered Damuda sandstones and shales, containing coal seams and fossil plants, to quartzites and slates, and from these to gneiss.

Another Himalayan paper by Mr. Ball refers to the origin of Naini Tál and the other lakes of Kumaun. The peculiarity of these lakes is due chiefly to the paucity of similar accumulations of water throughout the lower Himalayas in general; in the higher Himalayas lakes are common enough, and are, in numerous cases, clearly due to glacial action. Mr. Ball considers that the Kumaun lakes are not of glacial origin, but caused by landslips, as are a few other lakes in the lower Himalayas. The question cannot, however, be considered as definitely settled, for Mr. Theobald, who has recently examined the neighbourhood of Naini Tál, has come to a conclusion exactly the reverse of Mr. Ball's.

A subject of some interest has been discussed by Mr. Mallet in a paper on the 'mud-volcanoes' of Rámri and Cheduba, in which he shews, on what appears to me to be unanswerable evidence, that nothing resembling igneous volcanic action has been exhibited by these vents, and that they are due to the evolution of gaseous hydrocarbons, accompanied by water and small

quantities of liquid hydrocarbons, such as petroleum; both the gases and petroleum having been formed by the decomposition of vegetable tissue contained in the tertiary rocks of the islands. Several severe and paroxysmal eruptions are on record, accompanied by earthquakes, and during these eruptions, the gases, which are of course inflammable, have frequently been ignited, but this is a very different phenomenon from the ejection of red-hot lava and scoriæ. The cones of the mud-volcanoes are composed of clay, derived from the beds traversed by the gas on its way to the surface, mixed with water, and driven out by the gas. This determination of the non-igneous nature of the Rámri and Cheduba mud-volcanoes coincides with the observations made on similar vents in upper Burma and in Baluchistán, and shews that the idea, so frequently put forward in geographical and geological works, that the great line of volcanoes, which traverses the Malay Archipelago, terminates in Rámri, is erroneous. The northernmost extremity of the volcanic chain in question is probably to be found in Barren Island, and may have some connection with the isolated extinct volcanoes of upper Burma and Yunnan.

There are still three other subjects discussed in different papers in the Records of the Geological Survey for 1878, each of which is illustrated by a number of the "*Palæontologia Indica*" published during the year. Two of these subjects are intimately connected, both being stages in the investigation of that extraordinary series of sandstones and shales, so largely developed in south-western Bengal and the Central Provinces, and chiefly known from comprising all the coal deposits of the peninsula. This remarkable system, comprising the Tálchir, Damuda, Panchet, Mahádeva, Jabalpur and other groups or series, and now known by the collective term of the Gondwána system, has long attracted much attention, no less on account of the rich seams of coal and ironstone that it contains, than because of the peculiarities of its fossil fauna and flora, and a discussion, by no means ended as yet, has arisen, as to the relations between this fauna and flora and those found in various rocks of Europe and Australia.

It must be remembered that the data on which the geological history of the earth, as shewn by fossiliferous rocks, has been determined, chiefly consist of marine organisms, and that, although it cannot be positively stated that beds at remote spots on the earth's surface, if containing an assemblage of the same or of similar organisms, are of exactly contemporaneous origin, yet the fact, that the succession of marine life in all countries hitherto examined has proved to be the same on the large scale, is in favour of the view, that all deposits containing the fossils of one epoch, such as the jurassic, were formed at a period subsequent to the disappearance of forms of the previous epoch, such as the triassic. At all events no instance is as yet known in which a purely older fauna occurs in a bed of clearly later date

than another containing only the forms of a later epoch, and perhaps the nearest approach to such an anomaly is in Barrande's well known 'colonies' of lower silurian fossils apparently overlying upper silurian. I am not sure that this case of interposition can be yet considered as decided, but admitting the fact, as contended for by Barrande, the difference between upper and lower silurian is not equivalent to the difference, for instance, between silurian and devonian, much less to that between silurian and carboniferous, the next great and typical series in ascending order, nor can the change be compared to that between triassic and jurassic rocks. The freshwater and land organisms of past times, both vegetable and animal, are, however, far less thoroughly known than the marine, and it appears to have been assumed rather than proved that their succession has been as uniform throughout the land surface as has that of marine beings in the sea.

Now in the Gondwana system, with one or two exceptions in the upper subdivision, the only organic remains found are terrestrial or fluviatile, plants being much more common than animals. The few animals traced are chiefly reptiles, amphibia or fish, but these are of great interest, because similar forms, owing to their biological importance, have been very carefully examined and described almost wherever they have been found.

The animal remains have only been found in a few parts of the country. One of the richest of these is in the Panchet beds of the Rániganj coal field; another is in the neighbourhood of Sironcha, at the junction of the Pránhita and Godáviri rivers. In this last-named country there are several localities, at one of which, near the village of Kotah, remains of several species of ganoid fish have been found in limestone, whilst at another, close to a village site called Maleđi, teeth and bones of reptiles and fish have been discovered in red clay. The part of the 'Palæontologia Indica' to which I have referred contains descriptions of some of the Kotah fish by Sir P. Egerton, and of the teeth of *Ceratodus*, another fish found at Maleđi, by Mr. Miall, together with a brief note of my own upon the deposits in which the fossils occur. In the 'Records' is a paper by Mr. Hughes describing the geology of the upper Godáviri basin, between the river Wardha and the Godáviri near the civil station of Sironcha. Now Sir P. Egerton has shewn that the Kotah fish belong to the genera *Lepidotus*, *Tetragonolepis* and *Dapedius*, and are typically lower jurassic (liassic) forms. The *Ceratodus* from Maleđi and some other places is very closely allied to a triassic species, and it is associated with two reptiles, *Hyperodapedon* and *Parasuchus*, both triassic types. It is therefore very startling to find that Mr. Hughes is of opinion that the Kotah limestone is a bed of the Maleđi deposits, and that the two are in fact identical.

If this case stood alone, taking into consideration the great difficulty of surveying in the neighbourhood of Sironcha, on account of the very imperfect manner in which the rocks are exposed, and the prevalence of forest, it would be reasonable to doubt Mr Hughes's conclusions, the more so as Mr. King, who also examined the ground, and who at first thoroughly endorsed them, has since expressed some slight doubts, although these doubts appear due rather to Palæontological than to Geological considerations; but somewhat similar contradictions in homotaxis occur amongst the fossil plants of several Gondwána groups. The collections which have accumulated in the course of the last 25 years are now being examined and described by Dr. Feistmantel, who has already published accounts of most of those found in the upper Gondwána beds. One fasciculus of the "*Palæontologia Indica*," containing the plants of the Jabalpur group, appeared during the past year, and the flora was shewn to be closely allied to that found in middle jurassic (lower oolitic) beds in Europe. But some of the same plants have also been found in the Maledi beds associated with the triassic fish and reptiles. Other plants from the Maledi beds, it is true, indicate a lower horizon, but still one superior to the trias. Again, in Cutch, some of the Jabalpur plants recur together with others, all allied, like those of Jabalpur, to middle jurassic types in Europe; yet the plant beds overlies marine rocks abounding in upper jurassic mollusca. Last of all, the Indian coal measures or Damuda series, which are of lower Gondwána age, contain a flora considered by several botanists to be jurassic, but lately classed by Dr. Feistmantel as triassic. This flora, however, is most closely allied to one occurring in Australia in beds associated with others containing marine carboniferous fossils.

It may, I think, safely be inferred from these anomalies in the distribution of ancient terrestrial and fluviatile organisms in India, that such types did not exist at the same epoch as their nearest allies, often not to be distinguished in the fossil state, in other countries, and that the succession of life on land was less uniform than in the ocean. The fact that land regions at the present day, under the same parallels of latitude and enjoying the same climate, are distinguished by far more striking differences in their fauna and flora than marine provinces are, and that in some land regions, as in Australia, types have survived and even predominate, which in other parts of the earth's surface appear to have died out at distant past epochs, is quite in accordance with this view. It follows as a corollary that land plants and animals cannot be accepted as evidence of geological age with the same confidence as marine forms can.

It must not be supposed that the opinions just expressed are generally accepted. They are disputed by Dr. Feistmantel himself and by other

palæontologists. I think, however, the facts of the case must ultimately lead to conviction. It is of course impossible to describe the whole evidence here; a fuller account will be found in the 'Records of the Geological Survey' for 1878, in a paper on "The Palæontological Relations of the Gondwana System." But precisely the same important conclusion, the want of uniformity in the succession of terrestrial forms of life in distant countries, is enforced by the Sivalik fauna, the third subject to which a fasciculus of the 'Palæontologia Indica' and a paper in the "Records of the Geological Survey," both by Mr. Lydekker, have been devoted. The value of the part of the 'Palæontologia' is, I regret to say, much diminished by the inferiority of several of the lithographs, but the artistic difficulties to be encountered in this country are well known.

The importance of Mr. Lydekker's work on the Siwalik and other tertiary mammalian fossils may be easily appreciated by the circumstance that very large additions, many of them from new localities, have been made to the original collections described by Dr. Falconer, that Dr. Falconer's descriptions were extremely incomplete, a very large proportion of them, including nearly all the details, having only been printed after his death, and having been kept back by him for years with a view of rendering them more perfect, and that the Siwalik mammalian fauna appears to be far richer than any existing, and perhaps than any other assemblage of fossil mammalian remains hitherto examined. Although very few bones of animals inferior in size to a pig or a sheep are found, although no bats or insectivora and but 8 species of rodents have been discovered, no less than 84 species belonging to 45 genera have been detected and described up to 1878, including 11 elephants and mastodons, 7 rhinoceroses, and 6 giraffes or their allies, such as the huge *Sivatherium*. Two or three additional species of mammals have since been added.

The whole of this fauna is still assigned to the miocene period by many European palæontologists, and in the anniversary address of the President, Prof. Martin Duncan, to the Geological Society of London for 1878, the miocene age of the Siwalik fauna was advocated in very strong terms. The views held by those members of the Indian Survey who have written on the subject and have advocated a pliocene age for the Siwalik fauna were I think, rather underrated, and this is the more to be regretted, as several of the data quoted as adverse to those views are incorrect. Had the case really been as Professor Martin Duncan puts it, the Indian Surveyors would deserve to be ridiculed for bad reasoning, but I think it will be easy to shew that the arguments in favour of a pliocene age for the Siwalik fauna are much stronger than they are represented. I must refer all who wish to examine the argument more fully to Chapter XXIV of the 'Manual of the Geology of India,' but the principal facts are simple enough.

The Siwalik mammalian fauna consists of 21 extinct genera, comprising 30 species, and 24 living genera, represented by 53 species. Of the extinct genera, 10 are peculiar to the Indian tertiaries, 4 are only known to occur in Europe in miocene beds, whilst 7 are both miocene and pliocene; of the recent genera, 8 range back as far as the upper miocene in Europe, 10 are not known in older beds than pliocene, and 6 have elsewhere only occurred living or in post-pliocene deposits. Several mammalia are very closely allied to existing species.

Of six Siwalik reptiles sufficiently known to be fairly comparable, three are common living species now inhabiting the same area. All the land and freshwater mollusca found, so far as they can be identified, are recent species. The whole facies of the fauna, including *Mammalia*, *Reptilia* and *Mollusca* is decidedly more recent than miocene. All the reptilia and most of the mollusca found in the miocenes of Europe are extinct forms, and the proportion of extinct mammalian genera is usually greater than in the Siwaliks, though there are exceptions.

The palæontological data are confirmed by the geological. The Siwalik fauna is entirely derived from middle and upper Siwalik beds, the lower Siwalik or Náhan being unfossiliferous in the typical Sub-Himalayan locality. But in Sind some beds called Manchhar occur, corresponding to the Siwaliks, and in the lowest of these strata, there are found, together with some Siwalik species, remains of extinct genera not detected in the upper or middle Siwaliks, and in some cases characteristic of the miocene epoch. Amongst these genera are *Dinotherium*, *Anthracotherium*, *Hyopotamus* and *Hyotherium*. The lower Manchhar beds pass down into a group of marine strata, called Gáj beds, containing miocene (and apparently upper miocene) marine fossils. The age of the lower Manchhars cannot therefore be older than upper miocene, and as the Siwaliks contain a later fauna, and appear to be distinctly higher in the series, they must be pliocene. The Nerbudda ossiferous gravels, containing human implements similar in form to those found in the post-tertiary beds of Europe, are universally admitted to be of later date than the Siwaliks, and must consequently be classed as post-pliocene. In the address to which I have alluded Prof. Martin Duncan notices the difficulty of finding a place for the newer gravels in the Deccan, from which *Rhinoceros deccanensis* was obtained. This is on the assumption that these Deccan gravels are of later date than those of the Nerbudda, but there is no reason for believing that the two differ in age.

At the same time it is only right to add that the alliances between the Siwalik fauna and the European miocene are very marked, and that a few Siwalik forms, such as *Chalicotherium*, indicate even more ancient relations. Moreover some beds at Pikermi in Greece contain a fauna having



several points of resemblance to the Siwalik, and amongst the Pikermi mammals are several characteristic species occurring also in the miocene beds of Central Europe. The Pikermi fauna is consequently commonly quoted as upper miocene, both by geologists and naturalists. Now the Pikermi beds have been admirably described by M. Gaudry in a work entitled "*Animaux fossiles et geologie de l'Attique*," in which it is shewn that, at the base of the ossiferous gravels, there is a layer containing pliocene marine fossils, and that all these beds rest unconformably on lacustrine miocene rocks. The age of the latter, it is true, depends on plants, but the pliocene marine fossils of the Mediterranean area are too well known for a mistake to be possible as to their relations. The reasonable conclusion appears to be that the Pikermi mammals are pliocene also, and that some species survived to a later period in Greece than in Central Europe. It is highly probable that the miocene affinities of the Siwalik fauna are due to a similar migration to the southward of the animals which in the warmer miocene period inhabited central and northern Europe and Asia. Such a migration may have been facilitated by the circumstance that the Himalayas up to pliocene times were of small elevation, even if they formed a range of mountains, for it has been shewn that all the disturbance of the north-western Himalayas is of post-eocene date and much is post-pliocene. A similar migration to the southward is perhaps indicated by the presence of miocene plants in Greenland, and the possibility, as explained by Mr. Gardiner, that the beds containing these plants are really of eocene age. If the suggestion made by Wallace in his "*Geographical Distribution of Animals*" be correct, and the astonishing difference in the abundance of large animals in the later tertiary periods and at the present day be due to the extermination of the greater portion in the glacial epoch, it is evident that the refrigeration of the earth, known to have commenced as early as miocene times, had for its first effect the migration of many forms to the southward.

Before quitting the subject of Indian Palæontology, I am very glad to be able to announce an act of liberality on the part of the Government of India. It has been determined to engage Dr. Waagen's services for the description of Indian fossils, and thus to enable him to proceed regularly with the large collections from the Salt Range and other places. I am also happy to state that Professor Martin Duncan, who has described tertiary corals from so many parts of the world, has very kindly undertaken the examination of the large series of tertiary corals collected in Sind. We are also indebted to the same naturalist for having described some remarkable fossils from the Karákoram pass, occurring, apparently, in triassic beds, though Dr. Stoliczka's brief note does not state this so clearly as might be wished. These fossils are spherical with a



very peculiar structure, and have been alternately classed as corals, *Foraminifera*, and sponges, and even by one writer as Cystideans, a view which must have been derived from the examination of an imperfect drawing. It appears, according to Professor Martin Duncan's determination,\* that these singular "Karákorum stones" are examples of an entirely new class of *Protozoa*, distinct from sponges and *Foraminifera*, but most nearly allied to the latter, and chiefly distinguished by the absence of cells and by the much greater development of the tubular structure. For this new class of animals the name of *Syringosphaeridæ* is proposed.

Finally I am glad to be able to announce the completion of the Manual of Indian Geology, on which Mr. Medlicott and I have been engaged for more than two years, and which will, I hope, render the study of Indian Geology in the future somewhat less laborious than it has hitherto been, and enable all who are interested to gain some knowledge, at all events, of the science, without going beyond the limits of a single work. I have the pleasure of laying before you this evening the bound copy of this work, complete, with the exception of the index, which is now being printed. It is a deplorable circumstance that the late Dr. Oldham, under whose superintendence the greater part of the survey has been carried out, and to whom so much of the labour is due that has rendered it possible to prepare anything like a connected account of Indian Geology, should not have lived to see the completion of the Manual.

In Biology, although, owing to the sad gaps left in our numbers by the losses of the last few years, and by the absence of some of the most energetic members of the Society in Europe, the contributions to the Journal of the Society have diminished, there is no decrease in the work done, and the smaller number of the papers published in our Journal is partly accounted for by the publication of such works as "Stray Feathers." At the same time, as the continuance of these works shews the growing interest in different branches of science in India, our Society cannot but benefit indirectly from the rivalry.

The most important botanical work at present in progress is of course the 'Flora Indica' published by Sir Joseph Hooker, with the assistance of several excellent botanists. Of this Flora one part was published during the year, bringing the work down to the natural order *Myrtaceæ*, and, as I learn from Dr. King, another is nearly ready, completing the second volume. A large amount of material for Vol. III, is ready or nearly so. To the staff engaged in the preparation of this hand-book, Mr. C. B. Clarke, one of the best Indian botanists, has been added, and it may confidently be hoped that

\* Ann. Mag. Nat. Hist., Octr. 1878, Ser. 4, Vol. II, p. 297.

many years will not elapse before a complete hand-book of the Flora of British India and its dependencies will be completed.

Kurz's 'Forest Flora of Burma,' the last work of its lamented author, although dated 1877, only appeared at the commencement of 1878. It consists of two octavo volumes, and contains descriptions of all the woody plants, *i. e.*, trees and shrubs, about 2000 in number, hitherto detected in British Burma. Any criticism of this work is of course beyond my power, but it is easy for any one to recognize the very great amount of labour expended on its production, and I am assured, by both forest officers and botanists, that it is a most valuable addition to the botanical literature of India.

In zoology the field is so wide, and the observations so scattered, that it is difficult to select the particular points of importance. One of the most important works published during the past year is the British Museum Catalogue of *Chiroptera*, written by one of our members and a frequent contributor to our Journal, Mr. G. E. Dobson. The descriptions of Asiatic bats are copied from the author's Monograph of Asiatic *Chiroptera*, published by the Trustees of the Indian Museum two years ago. The effect of Mr. Dobson's studies of bats has been simply to render the mammalian order of which, previously, the least information existed, one of the best known amongst the smaller and more obscure sub-divisions of the class, and to place the study of the *Chiroptera*, at all events so far as generic and specific distinctions and geographical distribution are concerned, considerably in advance of such orders as *Rodentia* and *Insectivora*. The number of species of bats known to exist is 400: of these no less than 122 are Asiatic, and as the species in tropical and subtropical climates vastly exceed in number those found in temperate countries, it is not surprising to learn that, of these 122, a large proportion are found in some part of the territories belonging to British India, no less than 69 species being enumerated within these limits. In Dr. Jerdon's Mammals of India, published in 1869, the number of species of bats noticed was 55, not including purely Burmese forms. This, however, conveys an inaccurate idea of the additions made by Dr. Dobson, for many of the supposed species noted by Dr. Jerdon were merely varieties, differing in colouration alone.

Birds have, as usual, attracted far more attention than any other class of animals, vertebrate or invertebrate, and foremost amongst the publications devoted to them must be placed Mr. Hume's Journal of Ornithology for India and its dependencies, which continues to appear, under the title of 'Stray Feathers.' By far the greater portion of this periodical is from the pen of its proprietor and editor, and it is difficult to over-estimate the energy and hard labour by which alone a work of this kind can be published

by one busily engaged in official duties. Collections on the scale of Mr. Hume's have never been made in India before, in any branch of the animal kingdom, and much time and care are devoted to the determination and description of the large series of skins collected. Indeed Mr. Hume may fairly claim to have founded a school of ornithology in India, and the great attention now given to one of the most interesting classes in the animal kingdom, by training observers, has no small effect in leading to a study of other branches of zoology, less attractive perhaps at first, but of equal scientific importance.

Of 'Stray Feathers', one whole volume and part of a second have appeared during the past year, or more than has ever previously been published within the same period. The completed volume is entirely filled with a list of the Birds of Tenasserim, and is, in all respects, a great addition to our knowledge of one of the richest, though hitherto the least known, of the territories belonging to the Indian Government, and a country of singular zoological interest for two reasons, firstly, because few tracts on the earth's surface have been less changed by the hand of man, and secondly, because within the limits of the province there is one of those dividing lines between the faunas of different zoological subregions or provinces, the investigation of which is so essential in order to determine the history and causes of geographical distribution. The value of Mr. Hume's work may be partly inferred from the circumstance that his assistant and coadjutor Mr. Davison has collected no less than between 8000 and 9000 specimens of birds in the Tenasserim provinces, and that these and about 500 specimens received from other collectors represent 580 species out of the 669 believed, on good authority, to occur within the province. Mr. Blyth's list of the birds of all Burma, published in the Society's Journal for 1875, contained but 660 species, and of these at least 100 have been found in Pegu or Arakan, but not in Tenasserim, whilst 41 are said by Mr. Hume to be either not Burmese or else not distinct specific forms, so that fully 150 birds have been added to the avifauna of Tenasserim, (and, in most cases, this implies an addition to the avifauna of British India and Burma,) in the short space of three years. It is scarcely necessary to say that a large proportion of the additions are Malay species now detected for the first time in Southern Tenasserim. The whole bird fauna of British India and its dependencies, inclusive of Ceylon and Burma, as now known, comprises, according to Mr. Hume's estimate, about 1700 well authenticated species,\* whilst only 1008

\* Mr. Hume informs me that the number of species, roughly calculated, is 1793; of these probably about 93 are sub-species or varieties or of doubtful occurrence within the limits. If the neighbouring countries, as the Laccadives, Baluchistan, Afghanistan, Wakhan, Upper Burma, and the western half of the Malay Peninsula with Malacca,

were enumerated in Dr. Jerdon's Birds of India, the Assamese, Burmese and Ceylonese forms not being included.

Besides the volume on the Birds of Tenasserim, a goodly fasciculus of 172 pages has appeared, devoted to various Indian Ornithological subjects. Probably the most valuable paper is "a second list of the birds of Southern Travancore," a region quite as interesting as Tenasserim, and until recently equally neglected, as least so far as its birds were concerned. Some important additions too are made to the avi-fauna of the desert country in Western India, although it is to be hoped that such species as *Ruticilla mesoleuca* and *Lanius auriculatus* will not be included in the Birds of India until their occurrence within the limits has been verified on unquestionable evidence.

Captain Legge's 'History of the Birds of Ceylon' is a most important work, of which one quarto part containing 347 pages has already appeared. I am indebted to Mr. Hume for an opportunity of seeing an early copy of this part, the only copy, I believe, that has reached India, and I can only endorse his opinion that it is the best work of the kind devoted to Indian Zoology that has appeared. Carefully and systematically arranged, very much on the model of Dresser's 'Birds of Europe,' containing ample descriptions of plumage, habits, distribution, and nidification, it is still free from excessive discursiveness, and the plates, in which most of the species peculiar to Ceylon are represented, are excellent. The present part contains the *Accipitres*, *Psittaci* and *Picariæ*.

It is almost too soon to hope for a similar book on the birds of all India. Should such a work be produced, there are, I would suggest, two slight additions that would greatly increase its value in the hands of students. One of these is a key to the genera and species, the other the addition of lithographs or woodcuts giving details of characteristic parts, such as the bills, feet and primaries.

As ornithology appears to be the favourite zoological study of so many Anglo-Indians, it is impossible to avoid regretting the conservatism shewn in one respect by the leaders of the science in India. It is not surprising that Jerdon's 'Birds of India' should be a favourite book, for but few works on birds possess higher merits, and it is unquestionable that the existence of this book has aided greatly in fostering a taste for ornithology. But the classification adopted by Jerdon was antiquated and obsolete, even when his book was published, and very important advances have been made in our knowledge of the affinities of the various families since it appeared, so that at the present day there is really no excuse for such absurdities as the Penang and Singapore, all countries more or less under British protection, be added the number will be raised to 2000.

retention of gulls and ducks together in one order, and plovers with herons and storks in another. If there is any one point clearly made out, it is that gulls are far more closely allied to plovers than to ducks. This is, of course, only one instance out of several: the classification of swifts and goat-suckers beside swallows, of *Eurylaimidæ* beside hornbills, and of parrots next to wood-peckers are gross violations of natural affinity. Yet whilst almost everything else has been changed; whilst the nomenclature of a large proportion of the birds has been altered, a mass of additional information added as to range, habits and nidification; whilst the very limits of the country classed as British India have been so greatly extended as to change entirely the geographical range of the fauna, the worst feature of Jerdon's work, the classification, has been so religiously maintained that even the numbers given by him to the species enumerated are carefully quoted, and the numerous additional species inserted after their nearest allies. It is scarcely necessary to say that these remarks do not apply to Captain Legge's work on Ceylon birds, the arrangement of which, so far as it has gone, is consistent with our present knowledge of the class. We are, however, promised a most useful work on the Game Birds of India, including, it may be presumed, the *Anseres*, *Columbæ*, *Gallinæ*, *Fulicariæ*, *Alectorides*, and *Limicolæ* of Mr. Sclater's classification, but which would consist of broken fragments of orders under the old system. It is to be hoped that in this, which is very likely to be the first book on zoology studied by many future ornithologists, the classification will not be such as grievously to mislead every tyro who uses the work.

It is impossible to write of Indian ornithology without deploring the loss it has sustained in the death of the Marquis of Tweeddale, for many years past one of our first authorities on all subjects connected with the Avi-fauna of the Oriental region, who died at the close of the year after a few days' illness. To many of the working ornithologists of India, and especially to those who are carrying on the study in England, the loss will be irreparable, the more so as Lord Tweeddale was engaged upon a new edition of Jerdon's 'Birds of India.' Unquestionably such a work, compiled with the advantage of access to the libraries and collections of Europe, would have remedied the defects almost inseparable from the preparation of a similar monograph with only the means available in this country.

There is but little novelty to record in *Reptilia* or *Amphibia*. Colonel Beddome continues his discoveries amongst the wonderfully rich fauna of the Malabar hills, and some curious forms of lizards, snakes and frogs have been described by him. Some interesting forms have also been obtained by Mr. Davison in Tenasserim, and described in the Society's Journal, and a new snake has been captured in Sikkim, one of the last places from which a novelty could have been expected.

Dr. F. Day's work on the Fishes of India has been much delayed by the death of Mr. Ford, the artist, to whom the plates had been entrusted for preparation, and hitherto but one volume has appeared, containing the first 22 families of *Acanthopterygii*. Both descriptions and plates appear to be all that can be desired. It is to be hoped that, for the advantage of local students, who will have some difficulty at first in understanding the descriptions, a complete explanation of all scientific terms used may be appended, but the abundance of figures should render it easy to recognize the various forms. To the volume there are no less than 68 plates, exquisitely drawn, each representing on an average about 6 species.

When Dr. Day's work on the Indian fishes is concluded, we shall possess hand-books of all the vertebrate classes; Jerdon's Mammals and Birds, Günther's Reptiles and *Amphibia*, Theobald's on Reptiles alone and Day's on Fishes. But with the exception of the last, all these works are more or less imperfect, and require considerable additions in order to bring them up to the present state of our knowledge. The most imperfect of all is perhaps that on the *Amphibia*, the number of which, known to inhabit British India and its dependencies, has been greatly increased since Dr. Günther's work was produced. Large and expensive illustrated works are not so much needed as books on the model of Jerdon's, of such size as to be easily carried, and containing sufficient descriptions to enable any one with a little study to identify the animals he meets with.

But much as hand-books of Indian *Vertebrata* are wanted, there is a far greater need of similar aids to the study of the *Invertebrata*. In the course of the last few years a beautifully illustrated work on land and fresh-water shells, the "*Conchologia Indica*" of Hanley and Theobald, has been published, but I know of no other monograph of any large group of Indian invertebrates. The number of students would be greatly increased were the means of identifying the animals greater, and even from a practical point of view, the only view in which, I regret to say, the majority of the world is capable of sympathizing, much good might be done. For instance, the injury done yearly by insects to the crops of India is something enormous, without considering the mischief inflicted by our various six-footed rivals and enemies in other ways. Yet we scarcely know which kinds of insects are to be guarded against, nor what are their natural enemies, and any one desirous of ascertaining the species and of learning what is known about their habits must search through an extensive library in order to gain the information required.

In time much aid in the preparation of books on Indian natural history may be anticipated from the officers of the Indian Museum. The only work hitherto commenced on any portion of the invertebrate collection, Mr.



Nevill's 'Hand-list of Mollusca,' is little more than an enumeration of the specimens in the Museum. This by itself is extremely useful, and would be easily rendered more so by a reference to a description and figure in the case of each species, but it is a matter for regret that the labour spent in determining so many foreign land Mollusca, all comparatively well known, and perhaps better monographed than almost any other section of invertebrata, should not have been devoted instead to the preparation of a work on the marine Mollusca of the Indian seas.

One small fasciculus, containing three families of freshwater *Gasteropoda*, the *Ampullaridæ*, *Valvatidæ* and *Paludinidæ* was issued in 1877. This part contained numerous references, and many excellent critical remarks, but in the much larger part printed last year the remarks are comparatively much fewer, and scarcely any references are given. This, it is true, is not of much importance, since the Indian land-shells are mostly figured in the 'Conchologia Indica', and all can be found in Pfeiffer's monographs, both of which works are, of course, well known to every naturalist who pays more than a passing attention to the subject, but it may fairly be hoped that any future fasciculi containing lists of marine Mollusca will be rendered more useful to students by the addition of references, if not of descriptions. It is also, I think, unfortunate that Mr. Nevill should have adopted the classification of Carus and Gaerstecker, as it is, I believe, in error in classing together the *Helicinidæ*, *Cyclostomidæ* and *Cyclotidæ* in one suborder *Neurobranchia*, a suborder founded on the old false system of neglecting all the details of structure except the characters of one prominent organ. The breathing organ is selected in this particular instance, although its variability in some families of Prosobranchiate *Gasteropoda*, such as the *Littorinidæ* and *Cerithiidæ*, is notorious, and the close resemblance of these groups to some of the so-called *Neurobranchia* is manifest. It is true that Mr. Nevill has the majority of European conchologists with him, but very few of these have had the same advantage of becoming acquainted with the animals of operculated land-shells that Indian observers possess. If the *Cyclophoridæ* belong to a suborder of *Gasteropoda* distinct from that comprising *Littorinidæ*, and if the distinction of the supposed suborder *Neurobranchia* be founded on the absence of gills, why is not *Assimineæ* removed from the *Rissoidæ* (as is done by von Martens) and *Cerithidea obtusa*\* from the *Cerithiidæ*, and both classed with the other air-breathing *Gasteropoda*?

Another cause for regret, due I believe also to the evil example of Messrs. Carus and Gaerstecker, is the want of uniformity in the termi-

\* See Stoliczka P. A. S. B., 1869, p. 187, and 1871, p. 114. Dr. Stoliczka's most valuable observations appear to have been much overlooked by Malacologists.



nology used for names of families and subfamilies. In this matter it may be hoped in future that the British Association rules will be followed, and the terminations *idæ* and *inæ* employed, as they are by almost all English zoologists. It is confusing to find *Ampullariacea* and *Paludinidæ*, *Helicidæ* and *Auriculacea*, *Aciculidæ*, *Pomatiacea*, *Helicinacea*, &c., as families and *Onchidiidæ*, *Testacellidæ*, *Limacea*, *Philomycidæ*, *Arionidæ*, *Helicea*, *Vaginulidæ*, *Orthalicea*, *Succineacea*, *Otinea*, *Melampea* &c., *Cyclotina*, *Cyclophorina*, &c., *Pupinea*, *Cyclostomina* and *Realica* as subfamilies.

The value of Mr. Nevill's catalogue consists in the large number of authentic localities, and in the care which has been given to the generic and sub-generic classification of that most difficult family the *Helicidæ*. To a few details, such as the position assigned to *Camptonyx* and to the sub-genus *Thysonota*, I should be disposed to take exception, but I believe the greater part of the classification is sound. As a rule too, though not so often as would be desired, in each locality, the name of the province or district is given after that of obscure villages, streams or hills, a most important matter constantly neglected by compilers of catalogues, and which should be invariably attended to.

The promised description by Mr. Moore of the new species in the late Mr. W. S. Atkinson's large collection of Indian *Lepidoptera* will, it may be hoped, be in the hands of members of this Society before long. Meantime it is satisfactory to see that numerous descriptions of Indian butterflies and moths from the collections of Mr. Atkinson, Capt. Beavan, Col. Godwin-Austen and others have appeared within the past year in the Proceedings of the Zoological Society. In the same Journal for the preceding year Mr. F. Moore gave a complete list of the known *Lepidoptera* of the Andaman and Nicobar Islands, together with a table shewing the geographical distribution of each species, a most important addition. Mr. Wood-Mason has continued his notices of certain orthopterous forms in the same periodical and elsewhere.

During the past year, the arrangements for the description of the very varied collections made by the late Dr. Stoliczka in the Punjab hills, Káshmir, Ladák, the Kuenlun, Eastern Turkestan, the Pámir, Wakhán &c., when accompanying the mission sent by the Government to Yárkand and Káshghar in 1873-74, have been completed by Mr. Wood-Mason, and a commencement of printing the various reports has been made. The following is a list of the naturalists engaged in working out the different groups of *invertebrata*.

<i>Mollusca</i> ,.....	Mr. G. Nevill.
<i>Coleoptera</i> , .....	Messrs. D. Sharp, H. W. Bates and Dr. J. S. Baly.

<i>Hymenoptera</i> , .....	Mr. F. Smith.
<i>Lepidoptera</i> , .....	Mr. F. Moore.
<i>Neuroptera</i> , .....	Mr. R. McLachlan.
<i>Rhynchota</i> , .....	Mr. W. L. Distant.
Spiders, .....	Rev. O. P. Cambridge.
<i>Crustacea</i> , }	Mr. J. Wood-Mason.
<i>Orthoptera</i> , }	

The birds have been worked out by Mr. Hume, the fishes by Dr. F. Day, and the mammalia (except the bats, which Mr. Dobson has examined) and reptiles by myself. I have also compiled the geological portion of the work, and I have already noticed that some very interesting fossils will be described by Professor Martin Duncan. The parts containing the fishes, *Reptilia* and *Amphibia*, *Mollusca*, *Neuroptera*, *Hymenoptera* and Geology are now ready for issue, and those on Spiders and Mammalia are in the press. With so much able assistance, it may be hoped that we shall succeed in producing a worthy memorial of our late friend Dr. Stoliczka.

The archæological literature of India has been enriched by the publication of two Volumes, VII and VIII, of Reports from the Archæological Survey of India. Both these volumes are by Mr. Beglar. Of the "Indian Antiquary," certainly one of the most admirably edited periodicals ever published in India, parts have appeared monthly. The names of the writers in this Journal are sufficient to shew the value of the contributions, and it is manifest that the cessation from existence of those scientific periodicals in India that have attained Nirvana is due to other causes than want of raw material.

Few subjects of enquiry in India have made so rapid an advance in the course of the last few years as Meteorology. The establishment, first of provincial reporters, and then of a central office for the whole of India, has been succeeded in the last twelve months by a plan of telegraphic reporting. From the commencement of the monsoon in 1878, reports have been received once daily by telegraph from 3 stations in Assam, 10 in Bengal, 3 in Burma, 8 in the North-West Provinces, 7 in the Punjab, 8 in Bombay and Berar, 3 in the Central Provinces, 6 in Madras and 1 in Ceylon, or 49 in all. These reports give readings of the barometer, wet and dry bulb thermometers, the wind direction and amount of cloud, all observed at 10 A. M., and the rainfall in the preceding 24 hours, together with remarks on the weather. The returns of each morning are received during the day at the head quarters of the Government, either at Simla or Calcutta, and printed off, with remarks, in time to be issued early on the following morn-

ing. In the remarks all the principal features of pressure, wind, rainfall &c., during the preceding 24 hours are noticed. The Government of India has now sanctioned the continuance of this system permanently, and has authorized the publication, with the daily reports, of lithographed weather charts for India, similar to those published for some years past in the United States and several European countries. This improvement will come into operation shortly.

It is very satisfactory to find that the vast practical importance of extended meteorological observations, and of quick and accurate information, has been so rapidly recognized throughout India as has been the case, and that the great advantage to commerce and agriculture to be derived from a careful study of the changes in the atmosphere has been appreciated, if not to the extent that it deserves, still sufficiently to convince thinking men. The time may come when a meteorological report will have to be posted at every thannah in the empire in order to warn farmers when to expect rain or fine weather for their crops, and there can be no reasonable doubt that either a continuance of dry weather or heavy rainfalls could, in India, as a general rule, be foretold several days beforehand even now. Just as the storms of Western Europe are outstripped by the telegraph in their race from the American coasts to the shores of Great Britain, so the singular cyclonic movements to which, as Mr. H. F. Blanford has shewn, the heavy rainfall of the year is mostly due, are now predicted in Northern India before the atmospheric disturbance itself has travelled beyond the shores of the Bay of Bengal.

The publication of the 'Indian Meteorologist's Vade-Mecum' by Mr. H. F. Blanford in 1877 has furnished a record of the present state of Indian Meteorology. The work consists of two parts, the first containing Instructions to Observers, with a description of different meteorological instruments, instructions as to their use, and of the precautions to be taken in observing them, and rules for the reductions necessary. The second part of the work consists of a description of the meteorology of India, and comprises chapters on the physical properties of air and vapour, the Physical Geography of India and its dependencies, Radiation and Temperature, Atmospheric pressure and Winds, Hygrometry, Cloud and Rainfall, Storms, and suggestions for future enquiry. At the end of the work are tables of annual and monthly mean barometric pressure, temperature, rainfall, &c., and an accompanying volume gives the necessary tables for the reduction of observations. The work is intended to be a Manual or Hand-book of Meteorology for India, and whilst shewing how much has been ascertained in the course of the last few years, it will serve as a mark from which to measure future progress.

During the past year besides the Annual 'Reports on the Meteorology of India' for 1876, by Mr. H. F. Blanford, a large quarto work on the Meteorology of the Bombay Presidency, accompanied by a portfolio of beautifully engraved maps and diagrams, has been published in London by Mr. Charles Chambers, F. R. S., Principal of the Bombay Observatory. In this work a summary of the results derived from the observatory at Bombay since 1841, and especially from 1860, and for the last 17 years at Karáchi, Dísá, Púna and Belgaum, is supplemented by observations made at other stations. A second number of Indian Meteorological Memoirs has also been published in Calcutta, containing papers "on storms in Bengal with increased atmospheric pressure" by Mr. Eliot; "on the rainfall of Benares" by Mr. Hill; and "on the diurnal variation in the barometer at Calcutta and Hazáribágh" by Mr. H. F. Blanford.

The investigation of cyclonic storms has always been one of the first duties of the Indian Meteorological Department, and has become doubly important now when so large a portion of the rainfall has been shewn to depend on the same laws as the destructive gales of the Bay of Bengal. Mr. Eliot's masterly report on the Vizagapatam and Backergunge Cyclones of October 1876 was published in 1877, and was a most important addition to previous knowledge. The Backergunge Cyclone is probably the most destructive of which any accurate information has been recorded, for it caused the death of more than 100,000 human beings, but it furnished rather more data than usual for an examination of the meteorological phenomena which preceded and accompanied it. The result of the examination of these two cyclones was distinctly in favor of Mr. H. F. Blanford's local depression theory of the causes of cyclones.

I now learn from Mr. Eliot, who has officiated as Meteorological Reporter for the greater part of the past year, that an investigation of some of the recent cyclones has not only apparently confirmed the views held by Mr. H. F. Blanford and himself as to the origin of cyclonic storms, but has also shewn that the paths of the intense cyclones of May and October follow the lines (approximately if not exactly) of least relative atmospheric motion before the generation of the cyclone. The views referred to as to the origin of cyclones will be found described at length at p. 250 of the "Meteorologist's Vade-Mecum," already referred to, where it is shewn that the antecedent conditions are calm weather over the sea, with a barometric pressure equal or nearly equal around the coasts. Under these circumstances a large quantity of vapour is produced by the solar heat, and this vapour being unable to escape is again condensed and liberates a great amount of latent heat over the place of its production; the replacement of cooler by warmer air induces a local diminution of atmospheric pressure, and this causes a

violent indraught of air. In this indraught, cyclonic circulation is caused by the earth's rotation, according to known laws. Mr. Eliot has now determined that in all probability the path of the cyclone is due to the same antecedent causes as the origin of the cyclonic movement.

But little reflection is needed in order to show the importance of these conclusions as to the laws which govern the origin and cause of cyclones. It simply means that, with a few additional opportunities of observation, such as telegraphic communication with the Andaman and Nicobar islands would afford, it would be possible, if the theories are correct, not only to tell when cyclones may be expected and when they cannot occur, but to trace out the approximate course they must follow when formed, and to give warning to threatened portions of the coast days in advance instead of hours. The importance of this for the protection of the shipping is easy to understand. But the injury done by these terrible gales to the shipping, fearful as it is, is really small compared with the destruction of life and property on shore; it is probable that more lives were lost, and more property destroyed by the Backergunge Cyclone on land in a few hours, than by all the cyclones of the Bay of Bengal at sea in the course of the last century. It is not probable that the dangers of tropical gales can be averted, but much may be done to diminish the destruction of life and property by timely warning, and this can only be given if the course of the storm can be foreseen. This most important object appears now within our reach.

The progress of Indian Meteorology cannot but be satisfactory to the Asiatic Society, for it was in no small degree owing to the representations made to the Government of India by a Committee of the Society that the Meteorological Department, which has already achieved such important results, was established.

Although the above is so far from an exhaustive account of scientific work in India during the year 1878, that I fear, except in geology and in some branches of zoology, it gives a most imperfect idea of what has been done, I trust it will serve to shew how much labour is being expended in India upon scientific enquiry of various kinds. Time does not serve me to attempt a review of all that is being done in other parts of Asia. There are, however, two works published during the year, each a record of scientific travel, and each deserving of notice. One is the account of Colonel Prejevalski's journey to Lob-nor and the Altyn Tag, a range of mountains previously unknown, lying south of Lob-nor and forming the northern scarp of a plateau apparently connected with that of Tibet. The other is the first volume of Baron F. v. Richtofen's 'China,' containing a mass of

information as to that country, and especially as to portions of it previously very imperfectly known. Indeed there can be no question that this work, the results of its author's long residence and extensive travels in the interior of the Chinese Empire, will be for a long time to come the great authority on the Celestial Kingdom. The present volume contains, amongst other matters, full details of v. Richtofen's investigations of the loess-like deposits of China, deposits which he attributes to deposition from dust transported by the atmosphere. To the same origin Dr. E. Tietze has attributed the deposits in the upland plains of Persia, and it is not unlikely that he may be correct in so doing, although I myself thought these formations due to a different mode of deposition.

I had hoped in this address to enter upon at least one other subject, the distribution of the fauna of India, and to have reviewed the present state of our knowledge on the question. I had collected for this purpose some notes relating to the connection between India and some of the other zoological regions into which the earth's surface is divided, but the time at my disposal has not been sufficient to enable me to treat the subject as thoroughly as I could desire, and I must therefore postpone all remarks upon it for another opportunity.

The President added—In conclusion I have to propose a vote of thanks to the Honorary Secretaries for their labours on behalf of the Society. The amount of work, and hard work, done by them at all times is so large as to merit our hearty acknowledgements, and during the past two years, in consequence, in the first place, of the alterations in the Society's house, secondly of the absence of the Natural History Secretary, who has for so many years edited Part II of the Journal, and thirdly of the resignation of the Assistant Secretary and his replacement by another, there has been more to do than usual, and by far the greater portion of this additional work has been done, and, I am sure you will agree with me, very well done by Captain Waterhouse, who has now filled the office of General Secretary for the long period of  $6\frac{1}{2}$  years. We are also greatly indebted to several other gentlemen ;—to Mr. Medlicott, who undertook the duties of General Secretary for four months, during Captain Waterhouse's absence from Calcutta ; to Mr. Tawney, who very obligingly carried on the work of Philological Secretary, when the sudden death of Mr. Blochmann deprived us of his invaluable services, and to Dr. Hoernle, who has now accepted the Secretaryship ; to Mr. Gay, who was Treasurer until his departure from Calcutta in July, and to Mr. Beverley who has taken charge of our finances since. All of these gentlemen have given a large proportion of time, care and attention to the Society's business, and we are greatly indebted to all



for their aid. I think too the Society is to be congratulated upon the circumstance that so many members, all of them hardworked officers of Government, or of Educational Institutions, have offered to undertake onerous labour, when, owing to the sad loss we have experienced by the death of Mr. Blochmann, and in consequence of the absence of some of our most hard-working members, there has been an unusual amount of difficulty in providing for the current work of the Society. At the same time we have the more reason to be grateful to those upon whose exertions the progress and even the existence of the Society so largely depend, and I think the least we can do is to thank our Honorary Secretaries for the valuable work they have performed for us, and for the time and care they have devoted to our affairs.

The vote was carried unanimously.

The PRESIDENT announced that the Scrutineers reported the result of the elections of Officers and Council as follows :

W. T. Blanford, Esq., F. R. S.

*President.*

Dr. Rájendralála Mitra, Rai Bahádur, C. I. E.

H. B. Medlicott, Esq., M. A., F. R. S.

T. S. Isaac, Esq., C. E.

Capt. J. Waterhouse, B. S. C.

Rev. A. F. R. Hoernle, PH. D.

H. Beverley, Esq., C. S.

W. T. Blanford, Esq., F. R. S.

Dr. Rájendralála Mitra, Rai Bahádur, C. I. E.

Col. J. T. Walker, R. E., C. B., F. R. S.

Captain J. Waterhouse, B. S. C.

D. Waldie, Esq., F. G. S.

S. B. Partridge, Esq., M. D.

Bábú Pratápa Chandra Ghosha, B. A.

A. W. Croft, Esq., M. A.

H. B. Medlicott, Esq., M. A., F. R. S.

T. S. Isaac, Esq., C. E.

J. Anderson, Esq., M. D., F. C. S.

C. H. Tawney, Esq., M. A.

Rev. A. F. R. Hoernle, PH. D.

H. Beverley, Esq., C. S.

H. F. Blanford, Esq.

*Vice-Presidents.*

*Secretaries and Treasurer.*

*Members of Council.*

Messrs. J. Westland and R. Lydekker were appointed to audit the annual accounts.



The Meeting was then resolved into the Ordinary Monthly General Meeting.

W. T. Blanford, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From Dr. Rájendralála Mitra, Rai Bahádur, C. I. E., Facsimiles of Inscriptions and Maps, described in his work on Budha Gya.

2. From M. L. Dames, Esq., Bléw's *Geographie Universelle*, 1637, 12 Vols.

3. From T. W. H. Tolbort, Esq., Ra-binsau Kruso.

4. From Bábú Adharial Sen, B. A., Lalita Sundari and Kabitabuli.

5. From Rájá Ráma Vera, Prayashitta bhága, 2 parts, 4 Nos.

6. From Bábú Damodara Sastri, Vidyarthi, 6 Nos.

7. From R. Sewell, Esq., M. C. S., copy of his report to Government on Antiquarian explorations and researches in the Kistna District.

8. From L. Schwendler, Esq., copy of *Précis of Report on Electric Light Experiments*.

The following gentlemen, duly proposed and seconded at the last meeting, were ballotted for and elected Ordinary Members—

Lieut. C. R. MacGregor. Major J. Seonce. J. F. Dutbie, Esq.

The following are for ballot at the next meeting—

C. E. Buckland, Esq., C. S., proposed by T. W. Gribble, Esq., C. S., seconded by Capt. J. Waterhouse.

M. van Eetvelde, Consul General for Belgium, proposed by W. T. Blanford, Esq., seconded by Capt. J. Waterhouse.

E. O'Brien, Esq., C. S., Settlement Officer, Mozuffergarh, proposed by Carr Stephen, Esq., seconded by Capt. J. Waterhouse.

Major J. Biddulph, B. S. C., on special duty, Gilgit, Kashmir, proposed by Dr. J. Scully, seconded by Capt. J. Waterhouse.

A. Levinge, Esq., C. S., Joint Secretary to Government of Bengal, D. P. W., proposed by W. T. Blanford, Esq., seconded by A. W. Croft, Esq.

A. W. Garrett, Esq., M. A., Inspector of Schools, Presidency Circle, proposed by A. W. Croft, Esq., seconded by W. T. Blanford, Esq.

Major H. S. Jarrett, B. S. C., Secretary to the Board of Examiners, Fort William, proposed by Capt. J. Waterhouse, seconded by C. H. Tawney, Esq.

S. Harraden, Esq., Calcutta, proposed by W. T. Blanford, Esq., seconded by Capt. J. Waterhouse.

Capt. G. J. Van Someren, Forest Department, proposed by Major-Genl. J. T. Walker, R. E., C. B., seconded by Capt. J. Waterhouse.

Major J. Herschel, Survey of India, proposed by Major-Genl. J. T. Walker, R. E., C. B., seconded by Capt. J. Waterhouse.

A. Weekes, Esq., C. S., Collector of Champaran, proposed by the Hon. J. O'Kinealy, seconded by W. T. Blanford, Esq.

R. Pawsey, Esq., C. S., Collector of Champaran, proposed by the Hon. J. O'Kinealy, seconded by W. T. Blanford, Esq.

The SECRETARY exhibited some gold and silver coins received from Mr. H. Rivett-Carnac, C. I. E., and read the following note regarding them.

Mr. Rivett-Carnac says:

I submit for the inspection of the Society, three Hindu and three Muhammadan coins.

Of the Hindu coins, two are gold, and one silver. They are of the class termed '*Sitárami*' by the villagers, the idea being that the female figure represented *Sítá*, the male (?) figure on the obverse *Rám*.

They are supposed to weigh seven *másas* each, and each to be worth seven Rupees, the village rhyme running—

Sáth Masa,	Seven <i>másas</i> in weight,
Sáth dām,	Seven Rupees in value,
Ek war <i>Sítá</i> ,	On one side <i>Sítá</i> ,
Ek war <i>Rám</i> ,	On the other <i>Rám</i> .

They are obviously of the type figured in Thomas' "Prinsep," Plates XXIX, XXX. But it is not impossible that the legends may be different from those of coins in the possession of the Society, and I am encouraged by the interest taken in the *Sáh* (?) coin recently submitted through Dr. Rájendralála Mitra, C. I. E., to forward these also for inspection.

I would enquire whether *silver* coins of the Kanauj series are common? I have several gold ones, but this is the first *silver* "*Sitárami*" I have seen, and Prinsep has, I think, generally figured *gold* coins of this series.

As regards the Muhammadan coins, I cannot trace them in Thomas or Marsden.

The gold coin is a *Fírúz Sháh*, but which *Fírúz*? And the two silver coins, are they common, or known?

The gold coin seems to be the same as No. 50, Plate II (silver coin of *Fírúz Sháh Jálál-uddin Khilji*).

But Thomas mentioned no *gold* coin of that king.

*Note by Dr. Rájendralála Mitra.*

No. 1. A silver coin of Chandra Gupta.

No. 2. A gold coin of Kumára Gupta, apparently a cast coin—a forgery.

No. 3. A debased coin of Kumára Gupta. The metal is gold alloyed with about  $\frac{1}{3}$  of copper. There are some coins in which the gold and copper are in equal proportions—billon. Some such were found in Jessore thirty years ago, and noticed by me in the *Journal*, Vol. XXI, p. 401.

No. 4. A gold coin of Jalál-uddin Fírúz Sháh of Delhi—apparently the counterpart of the unique gold coin in the British Museum, noticed by Mr. Thomas in his "Pathan Coins," page 144. The legend is the same as in the silver coin figured No. 50.

No. 5. A silver coin of Nuçrat Sháh, son of Husain Sháh of Bengal, figured by Mr. Blochmann in the *Journal*, Vol. XLII, plate IX, fig. 2.

No. 6. A silver coin of Ghiás-uddin Mahmúd Sháh, son of Husain Sháh of Bengal and brother of Nuçrat Sháh. A rare coin, figured by Mr. J. W. Laidlay, in the *Journal*, Vol. XV, plate V, fig. 23.

The SECRETARY read the following communication from Mr. H. Rivett-Carnac, C. I. E., on the subject of preservation of Archæological remains in India.

*Memorandum by H. RIVETT CARNAC, ESQ., C. I. E., M. R. A. S., F. S. A., &c. on administrative Rules for the protection of Indian Antiquarian remains.*

I submit for the consideration of the Society, whether it would not be advisable that the Supreme Government should be addressed, with a view to the issue of some simple administrative rules for the better protection of the Antiquarian remains of the various Provinces of India.

Recently when staying with Mr Grant-Duff in England, I met Sir J. Lubbock, whose interest in such matters is well known, and on the subject being discussed, it was, I think, considered that some action was desirable. Mr. Grant-Duff, I understood, contemplated a representation being made to H. E. The Viceroy in favour of some such measure. But even if this has already been done, the subject is perhaps not undeserving of the attention of the Society.

The difficulties which Sir J. Lubbock's Bill for the United Kingdom has encountered are well known. But they are not likely to present themselves in the same form or in the same degree in India, where even legislative action will perhaps hardly be necessary, and where the district officers might, it is to be hoped, carry out without objection, the instructions approved by the Government.

I am not unmindful that the Government of India has, of late years, evinced considerable interest in the subject; that Archæology is one of the Departments under the Secretary to the Government of India for Revenue, Agriculture and Commerce; that Archæology also now forms a heading in the Administration Reports of all Governments and administrations; that

"laths" are not used now-a-days as rollers on metalled roads; that there is a prejudice against carved and inscribed stones being utilised as foundations for bridges and other building purposes; and that the Hon'ble Sir J. Strachey has recorded a very effective protest against the demolition of architectural remains for the manufacture of temporary triumphal arches. In the Central Provinces, of which I have some knowledge, the object has received much attention, and doubtless in many other parts of India of which I have no knowledge, the same good work is going on. The interesting archæological reports of General Cunningham shew that the examination of the antiquarian remains is progressing slowly but surely on a well-considered plan. And in the North-West Provinces, the action of Sir J. Strachey and the department created under his rule is doing much to ensure the preservation of interesting monuments, which another ten years of neglect might have placed beyond repair.

Still, with all this, it is desirable, I submit, that something more should be done to protect antiquarian treasures from demolition and spoliation. If it be held that heretofore the want of special measures has not been felt, it may fairly be answered that they are necessitated by the changes which India has undergone and is rapidly undergoing. The India of to-day is widely different from the India of Tod and of Prinsep. Those who are now employed in the country have less leisure for antiquarian enquiry than their predecessors. The official of 1879 has much of his time taken up with returns and reports, of which Tod knew nothing. The daily telegrams from Europe, the weekly mails from home loaded with cheap literature, enabling all who care to do so to keep pace with European thought, distract the attention from, and restrict the leisure available for, subjects of purely Indian interest. In old days, whatever of antiquarian value was discovered, was beyond the reach of the many, and either remained undistributed or was worked up for local publication. With rapid and cheap steam communication and the aid of guide-books, a new element has recently been introduced into the country. Now-a-days many of the most important places of antiquarian interest, are, comparatively speaking, easy of access, are marked on the maps and noticed in the guide-books, with which every tourist is provided. And there is now hardly a traveller with any pretensions to intelligence or culture, who does not consider it necessary, before returning home, to master roughly, the difference between "*Buddha*" and "*Siva*," and to carry back with him some proof of the results of his studies. The rich vein of Indian antiquarian interest once opened, the brass trays of Benares hardly satisfy the cultivated mind, and a brisk demand springs up for genuine fragments from Sanchi or old sculptures from Sarnath. The danger is perhaps not so much from the tra-

veller himself as from the Philistine class of guides and collectors whom the tourist creates. Hangers-on may now be found at many Indian hotels who devote a portion of the dull season to grubbing up the antiquarian relics of the neighbourhood and who during the tourist months display and descant on the value of their spoils in the verandah of Indian hotels. There is hardly anything too cumbrous in the shape of an inscription or figure for your cultivated tourist to collect, and to my certain knowledge, figures, inscriptions and bas-relief, whether of much real value, I cannot say, have been carried out and are being carried out of the country by tourists together with Benares toys, brass trays, and Delhi jewellery.

It may be held that the above view is somewhat exaggerated, and that if anything at all is really carried away, it is of little value and hardly worthy of objection. But admitting this, it will not be denied, there is some danger for the future, when the demand will most assuredly increase. From my own observation, I can state that there is little to prevent any one from digging at Sárnáth and carrying off and placing to no remunerative use, what in the hands of General Cunningham might be of real value to antiquarian research. And what applies to Sárnáth, may, so far as I know, hold good for many other parts of India, the antiquarian treasures of which are only now beginning to be explored.

As regards coins, the recent Treasure Trove Act now provides for some chance of the preservation, examination and publication of coins of interest, many of which would otherwise go into the melting pot, or into the hands of so-called collectors, who, as I have myself seen, think little of piercing the legend in order to utilise the coin as an ornament. But what is there to prevent the new class of guides or their myrmidons, when they have once realised the market value of such relics, from collecting slabs and tablets of more or less interest, for sale to travellers who are not certain to be able to appreciate their worth? And travellers are not the only offenders. Old carvings and sculpturings and inscribed tablets may sometimes, I believe, be seen in the rockeries or ferneries of station gardens. At present there is nothing, so far as I know, to prevent me, or any one like myself who pretends to take an interest in antiquarian research, from digging up a tumulus or demolishing the ruined wall of a temple, and annexing and placing to no real remunerative use, the relics which in the hands of an expert might prove of no small value in the determination of vexed points in Indian history.

The Hon'ble Mr. Egerton, C. S. I., the present Lieutenant-Governor of the Punjab, when Commissioner of Nagpur, discovered in a field near Rám-tík an inscribed slab which was found to contain a copy of Asoka's well-known edicts; although the edicts had been discovered in many other parts

of India, their existence in the wild out-of-the-way Nagpur Province was unknown. This discovery, placed by Mr. Egerton in the hands of General Cunningham, has proved of real value, as shewn by his recently published volume on Indian Inscriptions. But one cannot depend upon such treasures always falling into the hands of men like Mr. Egerton. Others ignorant of its value, might think little of bricking such a tablet into a wall or of utilising it, as I myself have seen an inscription used, to replace the broken leg of a school form.

What I urge is, that antiquarian remains, unless other well established interests exist, should be considered to be State property, and should be brought under the protection and management of the State, in the manner that Sir J. Lubbock's Act suggests, or as is provided for in the French system of "*Administration des Monuments Nationaux.*" And, save under permission from competent authority, I would not allow any one to dig, or demolish on any such ground, or to remove or place to his private use any specimen or relic that may be discovered. Investigations or excavations should be carried on upon an approved plan, the fortunate discoverer of anything of interest being obliged, as I believe is the rule in the Central Provinces, to report the result of his investigation to the Collector or Deputy Commissioner. A full description of the discovery should then be forwarded to the Government, and to the Asiatic Society, and the specimens found should, if necessary, become the property of Government for preservation in the Indian Museum. I would not of course advocate that the finder should not have every encouragement to describe the result of his labours, or obtain full credit for his research. To do this, would be to remove what often is the chief incentive to work and to dig. But local antiquaries may not always be competent to test whether a discovery is really of value or not. My object is to insist on the result of all such investigations being subjected to the test of efficient criticism, with a view to the publication of the results, where they are of value, and to prevent what may be of real interest being carried out of the country by those who may or may not appreciate its merits.

The subject, I submit, is not unworthy of the attention of the Asiatic Society of Bengal, which has done so much to promote an interest in, and to secure a record of the progress of Indian antiquarian research.

If supported by the weight of the recommendation of the Society, the idea would, I am sanguine, receive the attention of the supreme Government, many of whose members have evinced a valuable interest in the preservation of what still remains to us of the monuments of the Ancient History of India.

In conclusion, I would desire again to call the attention of the Society

to the remarks contained in my Memorandum of January of last year, published in the Society's Proceedings for February 1877, regarding the neglected condition of the celebrated Buddhist Stúpa at Sárnáth. Until recently, at least; no attempt had been made to save this grand old relic from ruin. The trees are still applying the powerful levers of their roots to the masonry of the tower. The massive stones with their beautiful tracery are being gradually but surely displaced, and must fall if some measures are not promptly taken to clamp or support them. If they do fall, I am quite confident there are many enterprising tourists who will gladly bid for the fragments of one of the most remarkable monuments of its class in the world.

Since this was written a notice has appeared of the discovery, as was to be expected, of valuable antiquarian remains in the country now occupied by our troops in Affghanistán. If no action has yet been taken it would be desirable, I submit, that instructions should issue that excavations should be carried out on a well-considered plan, and under competent supervision, and that the relics found should be kept together, and not distributed.

The following paper was read.

*On the Operations for obtaining the Discharges of the large Rivers in Upper Assam during 1877-1878—By* LIEUT. J. H. HARMAN, R. E., *in charge, Assam Valley Series, Survey of India. Communicated by* MAJOR-GENERAL J. T. WALKER, R. E., C. B.

This paper will be published in the Journal, Part II.

The reading of the following paper was postponed.

*The Snake Symbol in India, especially in connection with the Worship of Siva.—By* H. RIVETT-CARNAC, ESQ., C. S., C. I. E., &c.

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### LIBRARY.

The following additions have been made to the Library since the Meeting held in January last.

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### TRANSACTIONS PROCEEDINGS AND JOURNALS. *presented by the respective Societies or Editors.*

Benares. A New Hindustani-English Dictionary,—Part 18, November 1878.

Bombay. The Indian Antiquary,—Vol. VII, Part 87, December, 1878.  
Vol. VIII, Part 88, January, 1879.



- Pt. 87. *Rev. G. Shirt*.—Traces of a Dravidian Element in Sindhi.—*H. Rivett-Carnac*.—Masons' marks from old buildings in the North West Provinces of India.—*G. S. Leonard*.—Notes on the Kānpātā Yogis.—*J. F. Fleet*.—Sanskrit and Old Canarese Inscriptions, Nos. XLVIII and XLIX.
- Buenos Aires. Sociedad Científica Argentina,—Anales, Entrega V, Tome VI, Novembre 1878.
- Calcutta. The Indian Medical Gazette,—Vol. XIV, No. 1, January, 1879.
- . Geological Survey of India,—Records, Vol. XI, Part 4.
- Dr. W. Waagen*.—On the Geographical Distribution of Fossil Organisms in India.—*G. E. Ormiston*.—Submerged Forest on Bombay Island.
- . Mahābhārata,—No. 30.
- London. The Athenæum,—Nos. 2668 to 2670, December, 1878, and No. 2671, January, 1879.
- . The Geographical Magazine,—Vol. V, No. 12, December, 1878.
- . Nature,—Vol. XIX, Nos. 476 to 478, December, 1878 and Vol. XIX, No. 479, January 1879.
- Palermo. Società degli Spettroscopisti Italiani,—Memorie, Dispensa 10 to 11, 1878.
- Paris. La Société de Géographie,—Bulletin, Septembre, 1878.
- Antoine d'Abbadie*.—Instruments à employer en voyage.
- . Journal Asiatique,—Tome XII, No. 1, Juillet, 1878.
- Philadelphia. Monthly Bulletin, April to May, 1877, and Vol. II, Nos. 7 to 11, July to November 1878.

### BOOKS AND PAMPHLETS.

*presented by the Authors.*

- ADHARLAL SEN, B. A. Lalita Sundari and Kabitabali, I Vol.
- DAMOODAR SASTRI. Vidyarthi, 6 Nos.
- RAJA RAMA VERA. Prāyashchitta bhāga,—Pts. I and II, 4 Nos.
- TOLBOET, T. W. H. Ra'Binsan Kru'So,—Vol. I.

### MISCELLANEOUS PRESENTATIONS.

BLAEU. La Geographie Blaviane, 12 Vols.

M. L. DAMES.

BURGESS, J. Archæological Survey of Western India, 1878.

GOUGH, A. E. Papers relating to the collection and preservation of the Records of Ancient Sanskrit Literature in India.

HUGHES, REV. T. P. Notes on Muhammadanism, 2nd Edition.

HOME DEPARTMENT.

COOKE, DR. M. C. Report on the Oil Seeds and Oils in the India Museum, 1876.

Report on the Administration of the Customs Department in the Bengal Presidency for 1877-78.

Report on the Revenue Survey Operations of the Lower Provinces from 1st October 1876 to 30th September, 1877.

Report on the Administration of Bengal for 1877-78.

GOVERNMENT OF BENGAL.

RICE, L. Mysore and Coorg, Vol. III.

CHIEF COMMISSIONER'S OFFICE, COORG.

Selected Extracts from the Minutes of the Trustees of the Indian Museum, April 1877 to March, 1878.

INDIAN MUSEUM.

OVERBEEK, L. B. Bijdrage tot de Kennis der Weersgesteldheid ter Kuste van Atjeh, 1877.

DIRECTOR OF THE OBSERVATORY,—BATAVIA.

Report on the Administration of the Punjab and its Dependencies 1878.

GOVERNMENT, N. W. P.

Report on Public Instruction in the Madras Presidency, 1876-77.

MADRAS GOVERNMENT.

MARKHAM, C. R. A Memoir on the Indian Surveys, 2nd Edition.

### PERIODICALS PURCHASED,

Bombay. The Vedarthayatra, or an attempt to interpret the Vedas, Book 2nd, No. 14.

Bordeaux. Société de Géographie Commerciale,—Bulletin, No. 24.

Giessen. Jahresbericht über die Fortschritte der Chemie,—Zweites Heft, 1877.

Göttingen. Göttingische gelehrte Anzeigen,—Stücken 49 to 52.

———. Nachrichten,—No. 16.

Leipzig. Annalen der Physik und Chemie,—Band V, Heft 4, 1878.

H. Helmholtz.—Telephon und Klangfarbe.—R. Nahrwald.—Ueber die Luftelectricität.—R. Rühlmann.—Ableitung der Formeln für Messungen der Meeres-tiefen mit Hülfe des Manometers..

———. Beiblätter,—Band II, Stück 11, 12.

London. The Academy,—Nos. 345-347, 1878.

———. The Annals and Magazine of Natural History,—Vol. II, No. 12, 1878.

T. Workman.—Description of two new Species of Spiders from Rangoon (Plate XVIII, figs. 1 and 2).

- London. The Chemical News,—Vol. XXXVIII, Nos. 994 to 996, 1878.
- . The Entomologist,—Vol. XI, No. 1878, December, 1878.
- . The Entomologist's Monthly Magazine,—Vol. XV, No. 175, December, 1878.
- . Society of Arts,—Journal, Vol. XXVII, Nos. 1360 to 1362, December, 1878.
- No. 1360. *H. Clarke*.—Railways to India and Turkey.
- . The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science,—Vol. VI, No. 39.
- E. Edlund*.—Researches on Unipolar Induction, Atmospheric Electricity, and the Aurora Borealis. *O. Heaviside*.—On a test for Telegraph Lines.
- . The Messenger of Mathematics,—No. 91, 1878.
- . The Nineteenth Century,—No. 22, December, 1878.
- Maj. Genl. Sir H. C. Rawlinson*.—The Afghan Crisis. *W. R. S. Ralston*.—Beauty and the Beast. *Sir E. Perry*.—The Future of India.
- Paris. Revue et Magasin de Zoologie,—3<sup>e</sup> Serie Tome 6, No. 4, 1878.
- M. Girard*.—Recherches de M. Dareste, sur la production artificielle des monstruosités.
- . Annales de Chemie et de Physique, T. 15, Octobre, 1878.
- M. Berthelot*.—Sur les mélanges explosifs formés d'air et de poussières combustibles. *L. Foucault*.—Du spectre solaire et de son influence sur la vision dans les instruments d'optique.
- . Comptes Rendus,—Tome 87, Nos. 23 to 26, 1878.
- No. 24. *M. E. J. Mauméné*.—Sur la puissance d'absorption de l'eau par les bois.
- . Journal des Savants,—Novembre, 1878.
- M. M. Barthélemy Saint-Hilaire*.—Sept Suttas Palis, tirés du Dighâ-Nikâya.
- . Revue des deux Mondes,—Tome 30, 3<sup>e</sup> et 4<sup>e</sup> Livraisons, Decembre, 1878.
- . Revue Critique,—Nos. 49-52, Decembre, 1878.
- . Revue Scientifique,—No. 16, Octobre, 1878 and Nos. 23, 24, 25, Decembre, 1878, and No. 27, Janvier 1878.
- No. 23. *M. Rawlinson*.—La Question Afghane.
- No. 24. *Exposition Universelle*.—Les voitures de chemins de fer—La verrerie et la cristallerie.
- No. 25. *M. A. Angot*.—Les Inventions d'Edison.
- No. 27. *M. Duclaux*.—Charbon et Septicémie.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL.  
FOR MARCH, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 5th instant, at 9 o'clock P. M.

W. T. BLANFORD, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The receipt of the following presentations was announced—

1. From C. H. Dall, Esq. On the Remains of Later Pre-historic man obtained from the Caves in the Catherina Archipelago, Alaska Territory.
2. From Babu Ram Dás Sen. Aitihāsika Rahasya, Parts I and III.
3. From the author, Dr. Rájendralála Mitra, Rai Bahádúr, C. I. E., Buddha Gya, the Hermitage of Sakya Muni.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected Ordinary Members:—

C. E. Buckland, Esq., C. S.	A. W. Garrett, Esq.
M. von Eetvelde.	Major H. S. Jarrett, B. S. C.
E. O'Brien, Esq., C. S.	Major J. Herschel, R. E.
Major J. Biddulph.	A. Weekes, Esq., C. S.
Capt. G. J. von Someren.	R. Pawsey, Esq., C. S.
H. C. Levinge, Esq., C. E.	S. Harraden, Esq.

The following are candidates for ballot at the next meeting:

The Right Rev. the Lord Bishop of Calcutta, proposed by Capt. J. Waterhouse, seconded by Mr. W. T. Blanford.

A. C. Lyall, Esq., C. S., for re-election, proposed by Mr. W. T. Blanford, seconded by Mr. C. H. Tawney.

Babu Ram Saran Dás, M. A., Makbulgunj, Lucknow, proposed by Dr. R. L. Mitra, Rai Bahádúr, C. I. E., seconded by Capt. J. Waterhouse.

The SECRETARY announced that Mr. W. E. Bateman had tendered his resignation of the post of Assistant Secretary and Librarian to the Society, and that Mr. W. A. Bion had been appointed in his place on trial for 3 months.

The SECRETARY read the names of the following gentlemen, appointed by the Council to serve on the several Committees during the ensuing year :

*Sub-Committee of Finance.*

H. Beverley, Esq., C. S.	T. S. Isaac, Esq., C. E.
H. B. Medlicott, Esq.	Dr. J. Anderson.
Dr. Rájendralála Mitra, Rái Bahádur, C. I. E.	

*Library.*

Dr. Rájendralála Mitra, C. I. E.	A. W. Croft, Esq., M. A.
Colonel J. F. Tennant, R. E.	Dr. W. K. Waller.
Colonel J. T. Walker, C. B., R. E.	C. H. Tawney, Esq., M. A.
Dr. D. D. Cunningham.	The Hon. Whitley Stokes, C. S. I.
Babu Prannath Pundit, M. A.	H. H. Locke, Esq.
R. S. Brough, Esq.	R. Parry, Esq.
H. F. Blanford, Esq.	H. B. Medlicott, Esq., M. A.
Dr. O. Feistmantel.	H. Beverley, Esq., M. A., C. S.
John Eliot, Esq., M. A.	J. Crawford, Esq., M. A., C. S.
A. M. Nash, Esq., M. A.	Dr. Mohendralal Sircar.
Dr. J. Anderson.	Babu Pratapa Chandra Ghosha.
A. Pedler, Esq.	J. C. Douglas, Esq.

*Philology.*

Dr. Rájendralála Mitra, C. I. E.	Moulvie Abdul Latif Khán Bahádur.
C. H. Tawney, Esq., M. A.	Moulvie Kabiruddin Ahmad Sahib.
Major-Genl. A. Cunningham, C. S. I.	Babu Dijendranath Thákúr.
J. Beames, Esq.	The Hon. Whitley Stokes, C. S. I.
F. S. Growse, Esq.	Babu Prannáth Pundit, M. A.
Rev. K. M. Banerjea, LL. D.	Dr. G. Thibaut.
Babu Gaur Dás Bysack.	H. Rivett-Carnac, Esq., C. I. E.
Dr. Mohendralal Sircar.	Babu Pratapa Chandra Ghosha.
The Hon'ble J. O'Kinealy.	Dr. A. F. R. Hoernle.
Capt. H. W. Clarke, R. E.	

*Natural History.*

H. F. Blanford, Esq.	S. E. Peal, Esq.
H. B. Medlicott, Esq., M. A.	W. E. Brooks, Esq., C. E.
Dr. O. Feistmantel.	Dr. W. Schlich.
D. Waldie, Esq.	R. Lydekker, Esq.
A. O. Hume, Esq., C. B.	Capt. G. F. L. Marshall, R. E.
Dr. D. D. Cunningham.	Dr. J. Anderson.
Dr. J. Armstrong.	Lieutenant F. W. Jarrad, R. N.
Dr. G. King.	Dr. D. Brandis.

L. Schwendler, Esq.

*Physical Science.*

Colonel J. T. Walker, R. E., C. B.	John Eliot, Esq., M. A.
H. B. Medlicott, Esq., M. A.	T. S. Isaac, Esq., C. E.
H. F. Blanford, Esq.	Colonel J. F. Tennant, R. E.
D. Waldie, Esq.	Commander A. D. Taylor.
A. Pedler, Esq.	Dr. O. Feistmantel.
R. S. Brough, Esq.	R. Lydekker, Esq.
Dr. D. D. Cunningham.	The Hon'ble J. O'Kinealy.
A. Cappel, Esq.	A. M. Nash, Esq., M. A.
A. W. Croft, Esq., M. A.	J. C. Douglas, Esq.
C. H. Wood, Esq.	L. Schwendler, Esq.

*Coins.*

Colonel J. F. Tennant, R. E.	Major-Genl. A. Cunningham, C. S. I.
Dr. Rájendralála Mitra, C. I. E.	Colonel F. W. Stubbs, R. A.
Rev. M. A. Sherring.	H. Rivett-Carnac, Esq., C. I. E.

The SECRETARY read the following extract from a demi-official letter, dated 21st February, 1879, from Major H. C. B. Tanner to Major-Genl. Walker, Surveyor General of India.

"I told you in a former letter that I had found a new language. I am steadily going on with it for it is closely allied to the language of the Kafirs. My interpreter Hassain Khan, a resident of Kunar, teaches me; it is his mother-tongue, and he has brought to my aid one of the Sirdars of Kunar, Mir Ahmed Khan of Shewa (or Kél as the Kunar people call it). The Mir is very intelligent and has influence among all the tribes to his north, and I am quite confident that I require only his help to get me a footing in Kafiristan. He often comes to see me, and takes the greatest interest in my study of his language. He makes me read over what I have written down, for he says that I must learn the pronunciation of the upper and not of the lower classes.

"Shewa is at the mouth of Dara Núr (Valley of Light?) which runs into the Kund mountain. The villages up the valley are inhabited by Dehgans who are not Pathans, but descendants of the original people of this country (probably); and Mir Ahmad Khán has great influence among them. Beyond Dara Núr, there comes Mázár Dara which rises also in Kund, and flows S. E., falling into the Kunar River at Nurgal, and it is the inhabitants of this valley who are my stumbling-block. They are Pathans and Safis and have never become subjects of the Amír; and the other day, when the principal chief of the Kunar valley was coming in to tender his allegiance, they attacked him in force. Beyond Mazar Dara there flows Chauki Dara, also rising in Kund but having a course almost easterly (as I take it). The inhabitants are Safis and Momands and are not subjects of the Amir, and are therefore *yaghí*, or independent as they are termed.

"Now, beyond Chauki is Pech, a valley (or dara) also rising in Kund but flowing N. E. into the Kunar River. Of Pech I know little or nothing; but it is beyond Pech that the interesting and unknown tract of Kafiristan commences, and it is to introduce to you two of the inhabitants of the valley N. W. of Pech, that I have entered into this long and tedious preface. I had long heard of a tribe called Chúguni and I therefore sent the Subadar (Hussain Khan my interpreter) to bring some of them in to me. These Chúgunis are the next door neighbours of the Kafirs and live in a valley, which as far as I can understand, flows from Kund northwards and then turning east empties itself into the Kunar near Chágár Sarai.

"They are a powerful clan, and can number 6000 fighting men, but are true wild men of the hills, and seldom come as far as Jelalabad; and like all true and wild mountaineers, dislike to expose themselves to the unknown perils which may be experienced in travelling in an open plain. To sell their *ghi*, cheese and wood, the Chúgunis cross the head waters of the valleys I have named, and come down into the Dara Núr, at *Amla* (Indian name); and it was at that place that the Subadar found the two specimens which he brought to me. He had to give his nephew as a hostage and make many protestations of friendship before they would consent to come. Wild ragged fellows they were, of pale complexions and thin features. Their legs were clothed with coarse goat's hair socks, then an outer covering of goat's hair and such curious untanned shoes tied on in a cunning fashion. One of them spoke nothing but his own language, but the other, who was described to me as being a great warrior, spoke Pushtu; so with the Subadar as an interpreter we got on very well together. I kept the men four days and during that time, when I had leisure, managed to elicit a good deal of information about them and their valleys. The "warrior" informed me that he had been brought up amongst the Kafirs, and indeed I



found that his own language differed but little from that of the Kafirs which he appeared to know thoroughly. I learned—I cannot say with any amount of pleasure—that there are nearly as many languages in Kafiristan as there are tribes, but of this I am pretty well sure, that the one which I have been learning from the Subadar, may be taken as typical of the whole. I asked the Chúguni the numbers in the Kafir tongue, and they almost exactly correspond with those given by Burns, but the dialogue given by him differs as much from the Kafir language of my Chúguni, as the latter does from the Kunar language, which may be broadly called the Kunar dialect of the Kochis.

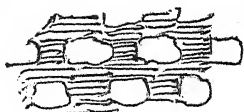
“My two wild men soon tired of this place and its novel and strange sights, and went away assuring me that my life would be protected by them in their own valley, as they would protect their own heads. They have gone under a promise to bring back two Lál Kafirs, and are to be here in 8 days, and it is with the Chúgunis that I must enter Kafiristan if I do it at all. They are half Kafir themselves, and though professed Mussalmáns they seem to have their sympathies more with the hereditary enemies of their co-religionists than with the Muhammadans.”

Capt. WATERHOUSE exhibited some gold and copper coins and relics &c. found by Mr. W. Simpson in the Ahin Posh Tope near Jelalabad, and read the following letter from Mr. Simpson to Colonel Colley regarding them.

“Yesterday morning (16th February,) I penetrated to the centre of the Ahin Posh Tope, and found the cell. In it there lay about two or three handfuls of what I suppose to be ashes, 18 gold coins, and a golden relic-holder, for wearing by a cord round the neck. It is  $3\frac{1}{4}$  inches long, and in it were 2 gold coins and a small dark-coloured substance which I suppose was a relic. All these objects I have delivered over to Major Cavnari, who is sending them off to Calcutta for Lord Lytton.

“I write this to give a very slight account of the position of the cell and the finding of the objects, all of which will no doubt be of interest to His Excellency. The tope is about 80 feet diameter, but I had to begin the gallery from what remains of the square base, which gave me about 45 feet of digging; and judging from other topes with galleries which were made to get at the articles deposited, I guessed that it would be wisest to go on the level of the lowest bed of stones. When the gallery reached the centre, the cell was at my feet.

“It had been formed of slates and on the surface of the ground. We apply the term “Buddhist Masonry” to the kind we find here. It is of stones with a slate packing. The accompanying sketch will give its



character. This peculiar kind of masonry may have had the earthquakes of this country in view. The Ahin Posh Tope is externally of this kind of building, but through the whole 45 feet of masonry within,

there was nothing but large water-worn boulders embedded in mud, and it was very hard work to dig them out. So when the men at last unbared some slate, I knew that the centre had been found. I was anxious to know exactly how it was arranged, and caused the stones to be cut out till I had got beyond it, and felt that there was no more slate either on its offside or at either end. I then lifted up a large slate about 3 feet long—beneath this was another large slate—and on raising it the central cell was opened. It was about 15 inches on each of its sides, I think it was intended for a perfect cube, about 15 courses of slate—I rather think it was 14 courses—I hope to measure it more perfectly. The most conspicuous object was the golden relic-holder. I had expected a jar with the ashes in it, but they simply lay on the bottom of the cell. The bottom being also slate—I could see one coin among the ashes, and as I began to gather them, coin after coin was found, till at last I counted 18 of them in all.

“There are some Roman coins among them, and one is of the reign of Domitian. This is important, as giving at least an approximate date to the Tope. That Emperor died 96 A. D., so the Tope cannot be dated earlier than that. I believe it is some centuries later.

“I am not up in coins, and we have no one here at the moment who can tell us about them, but you will no doubt be able to get them all explained when they reach Calcutta, and I should feel obliged for any account of them that may be made.

“I have also given Major Cavagnari some unimportant copper coins and other objects found in the excavation.

“The final destination of the coins &c. is a matter for Lord Lytton to determine. I would say either the Lahore Museum or the Indian Museum at South Kensington. Kindly point out to Lord Lytton that it would be as well to consider also where all sculptures and other archaeological finds should be sent for presentation, and where they would be of use to Archaeologists.

“I am now told that the exploration of the many topes we see here already opened was the work of Masson. Why he left such a prominent tope as the Ahin Posh one untouched I do not know. There is another very large one, it is 100 feet diameter, known as the “Ummer Kheyl tope,” which I think is untouched, I feel now a very strong desire to have it opened. About three-fourths of the topes hereabouts have been

opened, but I know a good number which are still with their finds within them, but the Ummer Kheyl one ought to give us something: a message from you would get it done quickly.

"I am still going on bringing to light what remains of the architecture of the Ahin Posh Tope, and we have now visible some figures in plaster which remain on the square base. In a few days it will be so far advanced that a proper plan can be made."

Capt. WATERHOUSE said that of the 20 gold coins 3 were Roman and the remainder Greek, one showing a good figure of the preaching Buddha with an inscription in Greek BOΔΔΟ. The relics and other articles consisted of a gold relic-holder inlaid with garnets and containing two gold coins and a piece of relic.

A piece of clear white glass with dark blue raised bands.

2 pieces of shell.

11 copper coins.

1 piece of red stone.

1 small leaden bullet.

1 small glass (?) bead.

1 piece of fused glass.

He had heard that these coins and relics had been received by the Viceroy, and thinking that they would be of interest to the Society, he had written to the Private Secretary for permission to exhibit them at the meeting.

Dr. HOERNLE and Mr. TAWNEY made some remarks on the coins.

The PRESIDENT said that the Society was greatly indebted to His Excellency the Viceroy for an opportunity of seeing these interesting coins &c. As they had only been received that evening there had been no time to examine them thoroughly as yet.\*

Dr. HOERNLE exhibited a MS. of the well known Prākṛit grammar of Vararuchi, edited by Professor Cowell. In many points its readings differ considerably from those of the published text. For example after viii, 37, there is an entirely new sutra: *chhijjabhijjāv apy eke || chhijjai, bhijjai ||* The phraseology of the commentary is generally different and very much more concise. The Sanskrit translations of the Prākṛit examples are, as a rule, omitted. Instead of 12 chapters there are only 10; the last one containing all the rules of the usual 10th, 11th, 12th chapters and dividing them merely by the remarks *iti paisāchī* after x, 14, and

\* Dr. Hoernle has succeeded in determining all the coins, among which he finds two unique ones. They will be described at the next meeting. Ed.

*iti mágadhí* after x, 31 (=xi, 17). The last rule x, 63 (=xii, 32) has the following commentary added: *mahārāṣṭrōdbhavām bhāṣhām viśuddham prākṛtam viduḥ, ity uktāḥ* ||. The whole ends with the formula *iti Vararuchivirachitāyām manoramāyām vṛttau bhāṣhaviḥbhāṣhavi-bhāgo nūna daṣamaḥ parichhedāḥ* || *saṁpṛtā cheyam manorama vṛttiḥ* ||. The commentary accordingly is here ascribed to Vararuchi himself, and not, as usual, to Bhamaha; so also at the end of the 2nd chapter, *iti vararuchikṛtāyām manoramāvṛttau dvitīyaḥ parichhedāḥ* ||. On the other hand at the end of the 1st chapter the formula is *iti vararuchikṛte prākṛtaprakāṣe prathamāḥ parichhedāḥ*. In the remaining chapters no author is mentioned at all; the uniform formula being *iti manoramāyām vṛttau (tritīyaḥ etc) parichhedāḥ*. The MS. bears no date; but its appearance is old. The characters are Nāgari; now and then rather indistinct from age; in other places evidently re-drawn wrongly, sometimes by a later hand. It consists of 11 leaves (paper), of 18 lines each. It belongs to Paṇḍit Rāmadatta of Amritsar (Panjāb). An accurate list of all its various readings has been made.

The following papers were read:—

1. *The Snake Symbol in India, specially in connection with the Worship of Siva.* By H. RIVETT-CARNAC, Esq., C. I. E., M. R. A. S., F. S. A., &c.

(Abstract.)

The author begins by stating that the snake as a personal ornament or as a canopy surmounting the figure is not confined to representations of Siva, but is to be seen overshadowing Vishnu, Garuda and others. The snake symbol also appears in the prehistoric cromlechs and menhirs of Europe, in which also traces of phallic worship may be traced. The author's attention has been given to the subject chiefly in connection with the worship of Siva, with a view to ascertain whether the worship of the snake and that of Mahādeo or the phallus may be considered identical, and whether the presence of the serpent in the prehistoric remains of Europe can be shown to support his theory that the markings on the cromlechs and menhirs are indeed the traces of this form of worship, carried to Europe from the East by the tribes whose remains are buried in the tumuli.

The author then describes a series of articles in brass, obtained in the Benares bazar, in which the snake is found in one form or another. These articles accompanied the paper, and were exhibited to the Meeting.

The paper will be published in the Journal, Part I.

Since the meeting, Babu Pratapa Chandra Ghosha has kindly forwarded the following note on the articles exhibited by Mr. Carnac.

It is interesting to observe how the ornamental and the artistic help in complicating the myths of the Hindu religion. The occurrence of the snake on several of the articles exhibited is ornamental in some and inconsistent with the Sástras in a few. The snake on the spoon or ladle is for ornamental purposes, and that on the bell is altogether out of place. The Sástras make no mention of the necessity of any such figures on the handles of spoons, sacrificial ladles or water-pots. In the case of the bell the only figure directed to be represented on a religious bell is that of Garuḍa, the bird-god. The Padma Purana has the following—"He is not a Bhágavat (worshipper of Bhagaván) in this iron age who has not in his house a conch-shell or a bell surmounted by a Garuḍa or the bird-god." Such a bell as the above is used in the worship of Vāsudeva (Vishnu). And although in the Sástras regarding the worship of Siva and Rámachandra, it is nowhere provided that the bell used in such service should be adorned with figures of snake and Hanuman, (the monkey-god), the váhanas of the two gods respectively, yet the bell-maker in his devoutness has added these figures to the bell thinking that such a bell would serve the threefold worship of Siva, Vishnu and Rámachandra. The white paint of sandal-wood paste on the lingam in the form of a circle or a semicircle and a dot, is intended to represent the sacerdotal thread (*poitá*) and the mark (*phontá*) and, in the case of the semicircle, the half moon which is said to adorn the forehead of Siva.

In the paper on Tree and Serpent worship published in Part I, No. 3, J. A. S. B. for 1870, Ananta the serpent king is said to have a thousand heads and four arms. In the Briddha Baudháyana quoted by Hemádri, a Nág is ordinarily described to have five heads.

कुर्यान्नागं सुवर्णेन फणा पञ्चकसंचृतं ।

In the Visvakarmá Sástra, Anantá is said to have a hundred thousand heads, and the other secondary eight Nágas to have seven heads each.

अतदेव कर्तव्यः स्फुरन्मौक्तिकसन्निभः ।

+ + + + +

द्विजिह्वो बहवः सप्तफणा मणिसमन्वितः ।

A Nága is said to have hoods and the body of a man, the lower extremities being like those of a reptile. A *sarpa* or serpent is a reptile. The three-headed or the nine-headed snakes are imaginative figures, they have no foundation in the Sástras. The figures of snakes forming backs of

the shrines exhibited are evidently artistic and ornamental, they have no direct connection with serpent worship.

Cup-marks occurring in the vicinity of sepulchral monuments suggest their origin in the Smritis, in which it is stated that after the cremation of the body, the son of the deceased is directed to offer water and milk नीर and क्षीर to the manes of the departed, and the water and milk are generally presented in unburnt clay cups, and it is not unoften that they are poured in little hollows made with the finger on the soft ground of the river side where the funeral ceremony is generally performed. May not the cup-marks on stone slabs represent these water and milk cups offered to the spirits of the departed?

The ant hill has been known to be a resort of snakes where these reptiles have been seen to coil themselves up for comfortable and warm lodging. The eggs of ants and the queens of the same are well known favourite food of snakes.

2. *Précis of a Report on Electric Light Experiments.*—By  
L. SCHWENDLER, ESQ.

MR. SCHWENDLER said it would be impracticable to read the "Précis of Report on Electric Light Experiments" *in extenso*, since it contained too many technicalities which could not easily be followed if the paper were read in the manner usual at these meetings, and that he therefore would prefer to give verbally a short account of his researches and the results obtained. He stated that the enquiry originated with General Strachey who, in April 1876, recommended to the Secretary of State that a trial of illuminating Indian Railway Stations by the electric light, should be made. In February 1877, Mr. Schwendler was requested to institute detailed enquiries which led him to propose that it would be advisable to first make some more experiments, before a practical trial at Indian Railway Stations should be attempted. The Board of Directors of the East Indian Railway Company agreed to this, and sanctioned the necessary outlay, whatever it might come to.

The experiments made at the India Office Stores, London, terminated on the 1st November, 1878. The report, however, could not be finished in time, before Mr. Schwendler left for India, and he therefore prepared a Précis—the paper before the meeting to-night. After pointing out the general results obtained, and explaining in a brief manner the three principal questions at issue, viz.—

*Economy of the electric light; practicability and efficiency of the electric light for certain illuminating purposes; and best means of distribution of the electric light*—Mr. Schwendler proceeded:



You all have heard no doubt a great deal about the division of the electric light. During the last two years this question has been before the public almost permanently. This is not to be wondered at if we consider that on the solution of this problem it will ultimately depend whether the new mode of lighting becomes a successful and general rival to the illumination by gas, or other combusive means. But before entering on the subject it will be best to formulate the question definitely, to avoid any misunderstanding with respect to the answer I am about to give. The question is: A given permanent current (C), no matter how produced, does work in a closed single circuit of total resistance (R), of which a part (r), represents the resistance of *one* electric arc. This electric arc produces an electric light of *measured* intensity (I). Now if we introduce instead of *one* arc, *two* arcs of resistance  $r'$  and  $r''$  and measured light intensities  $i'$  and  $i''$  respectively, and suppose the current to be the same as before—or the E. M. F. and total resistance in the single circuit the same, then *a priori* we should conclude that  $I = i' + i''$  for  $r = r' + r''$ . Experiments, however, show that this is not the case, *i. e.*, the sum of the measured intensities of *two* small lights is perceptibly smaller than the measured intensity of *one* large light, and this difference becomes larger and larger as we increase the number of lights produced by the same current, *i. e.*, by the same E. M. F. with the same total resistance in circuit. This appears at first sight an inconsistency with the known laws of *cause* and *effect*. How is it possible that the *same* current through the *same* resistance should produce more light in *one* point than in *two* points, although the total amount of work done by the given and constant current is exactly the same in *one* point as in *two* points?

That the *measured* intensity of *one* light, is invariably greater than the sum of the measured intensities of *n* lights, is an undoubted fact proved by my own experiments very conclusively. But we may well ask what has become of the energy which is expended and does not appear as light?

A careful analysis of all the physical facts connected with the subject will, however, show easily enough how this apparent loss of energy is to be accounted for, without reverting to far-fetched explanations, and without the necessity of making such statements as: "the division of the electric light is in contradiction to dynamic principles;" or "the laws of nature must be reversed"—whatever that may mean; or "new laws have to be discovered first, before a solution of this important problem could be even attempted;" &c. &c., which I have read frequently in scientific or professional journals and newspapers. Statements of this kind appear very clever to the uninitiated, and they are exceedingly cheap to make, but they



will invariably do an enormous amount of harm towards the further progress of an important application of the resources of nature.

It will be seen from the foregoing that I have called the light intensity—*measured* intensity. For if we produce a light by any source, it will be at once perceived that not *all* the light produced by that source can be made available for illuminating purposes. A part of the total light will be lost for the special purpose of illumination, inasmuch as only a part of the total light is in a position to act on the Photometer, or which is the same, on the retina. Hence we may say, the total light produced by any means consists of two parts—the one is lost for illuminating purposes, and may be called *internal* light; the other acts on the retina, can be measured, and may be called *external* or *measured* light. For instance, of all the light produced in *one* electric arc, a considerable part is hidden by the electrodes between which the arc plays. Because the electrodes have a volume, and moreover the positive electrode is hollowed out like a dome, and it is the highest point of that dome, which contains the most intense light, which is mostly lost. How much this loss in each case will be, depends on a variety of circumstances. In the first place, all other conditions being the same, that loss will increase with the thickness of the electrodes. The loss of light will further increase with a decrease of the length of the arc. By length of arc is to be understood the distance between the highest point of the hollow of the positive electrode and the apex of the negative electrode. Hence already in the case of *one* arc, although naturally we have here the longest arc, for the given current and the given electrodes, the light lost or the *internal* light may represent a considerable portion of the total light produced in the arc.

If we produce *two* arcs, it will be seen *at once* that the sum of the losses must be greater than the loss in *one* arc. Hence the sum of the measured intensities of two lights must also be smaller than the measured intensity of *one* light. Suppose the length of *one* arc, when a given current passes, is 3 m.m., then the sum of the lengths of *two* arcs will not be 3 m.m., but much less, in order to have the same current passing through the *two* arcs as passed before through *one*. From this it follows that the loss of light must increase rapidly with the number of lights, and moreover that soon a limit to the possible practical division of the electric light is reached, leaving out the question of economy altogether.

This constitutes one of the reasons why the division of the electric light becomes less and less economical with increase of the number of lights, and that soon a practical limit will be reached for the division.

To express this result more definitely, we may say :

The consumption of power per unit of *measured* or *external* light is an increasing function with the number of lights produced by a given current in a single circuit.

Supposing, of course, always that the sum of the resistances of  $n$  arcs is equal to the resistance of *one* arc, and that the other resistance in the circuit, in which no light is produced, has remained constant throughout.

If we had a material infinitely conducting, of infinite strength, and with a melting point at least as high as that of carbon, then surely the division of the light would be perfectly economical, up to any limit, inasmuch as we might then use linear electrodes.

In practice we can only try to approach this limit. Up to the present time, there appears to be no better material for electrodes than carbon, either natural or artificial. But this is no reason why an effort should not be made to try to find a material for electrodes more accommodating to the division of the electric light than even carbon. The above, limited strength, limited electric conductivity and limited melting point of the material of electrodes, constitutes only *one* of the difficulties, which stand in the way of an unlimited economical division of the electric light.

A second cause is for instance the fact that in each arc an E. M. F. is established in opposition to the original E. M. F. and by no means to be neglected against it. This secondary E. M. F. established in each arc, appears to be a function of the current which passes the arc, most likely proportional to that current. Hence, if for a given current passing *one* arc this secondary E. M. F. be  $e$ , then the same current through  $n$  arcs, successively connected, would produce an E. M. F. equal to  $ne$ . This secondary E. M. F.  $ne$  is to be subtracted from the original E. M. F., and internal resistance of the original E. M. F. plus resistance of leading wires having remained constant, we necessarily have to decrease the total resistance of the  $n$  arcs in order to work with the same current as before. This merely means a decrease of the total length of the  $n$  arcs, or which is the same, an increase of internal light or decrease of the *measured* or *external* light. A parallel connection of the  $n$  arcs with reference to the poles of the given original E. M. F. would certainly produce only *one* secondary E. M. F. instead of  $n$ , and for this reason it might be better to use the parallel circuit for the division of the electric light. But there are other very important objections to this solution. In the first case, as can be easily shewn, the variation of *one* arc has a far greater influence on the variation of the others, in parallel, than in successive circuit. Further, the length of each arc must be made very much smaller, in parallel circuit than in consecutive circuit.

Another reason against an unlimited economical division of the elec-

tric light is constituted by the practical necessity that lamps, of whatever construction they may be, have a resistance inherent to their nature in addition to the resistance of the arc. For instance, in an ordinary lamp with an electromagnet, the resistance of the lamp consists of the resistance of the electromagnet plus the resistance of the two electrodes when metal-lically closed. This resistance, although small, is by no means nil, and cannot be neglected against the resistance of the arc, especially when strong currents are used. In other words, when producing the electric light in  $n$  points instead of one point, we are unable to fulfil practically the condition, that the sum of the resistances of the  $n$  arcs is equal to the resistance of *one* arc to have the same current, *i. e.*, the former must be made smaller than the latter on account of practical construction-reasons.

We may therefore sum up as follows: *The economical solution of the division of the electric light is theoretically quite possible, but practically difficult to obtain.* The division can never become unlimited, but ingenious inventors may nevertheless *solve the problem practically.*

Any attempt by inventors to solve the question is therefore perfectly legitimate. If their attempt cannot lead to a perfect solution, they may nevertheless do so approximately, and by it tend towards real progress in illumination, inasmuch as by their attempts the electric light may probably become more and more a successful general rival to gas, which at present it certainly is not.

Before I conclude, I must briefly advert to a paper on "the Electric Light" by Mr. W. H. Preece, published in the *Philosophical Magazine* for January 1879, in which the author believes that he has demonstrated from dynamical considerations that the division of the electric light is impossible. This it certainly is under the conditions introduced by Mr. Preece, *viz.*, that the resistance of each voltaic arc, or each incandescent wire, is maintained *constant*. But it is unfair to the electric light to introduce this condition, especially as it does not at all represent the question at issue.

When a number of lights are connected in series, the resistance of each must be diminished, and when a number of lights are joined parallel, the resistance of each must be increased, in proportion to their number, so as to maintain the total external resistance constant. If Mr. Preece will introduce this condition into his equations he will find that theoretically the division of the electric light is quite possible, *i. e.*, that, theoretically, however the lights be arranged, the unit of light will always be produced by the same expenditure of energy. Inventors should not therefore be down-hearted. On the other hand, investors in gas need not hasten to get rid of their shares, for there are many questions involving

practical difficulties which still remain to be solved ; but, at the same time, gas companies should be aware that they have a formidable rival in the field, and bestir themselves to maintain the lead they hold by improving their own means of illumination and extending its application.

*Précis of the Report on the results obtained by the Electric Light Experiments instituted on behalf of the Board of Directors of the East Indian Railway Company.—By LOUIS SCHWENDLER, Superintendent Electrician of Government Telegraphs in India (on special duty in England), dated 1st November, 1878.*

*Results obtained.*—The questions which I set myself to answer by direct experiment were :—

I.—QUANTITY OF LIGHT PER UNIT OF POWER, UNIT OF SPEED,  
AND UNIT OF MONEY (FIRST OUTLAY).

To solve this question I have tried four different Dynamo-electric Machines producing the electric current in *one* direction, viz.—

Dynamo-electric Machines { A Medium size,  
  { B Small,

as supplied by Messrs. Siemens, Brothers, of London (construction :—Siemens ; system :—Hefner von Alteneck).

Dynamo-electric Machine C, *workshop pattern*, as supplied by Messrs. Soutter & Lemonnier, of Paris (construction :—Gramme).

Dynamo-electric Machine D, with two sets of brushes, as supplied by the British Telegraph Manufactory (construction :—Gramme).

Careful, severe, and long-extended trials, during the time of my experiments, have established that these four machines are all sufficiently practical for the production of the electric light, but that, as a rule, the statements of their actual efficiency were not found to be in conformity with the results obtained from my own experiments. The quantity of light produced by these dynamo-electric machines had been *overrated*, and the amount of power consumed *underrated*.

This discrepancy between my results and those of others is probably to be explained by the difficulties which stand in the way of executing trustworthy photometric measurements.

But, notwithstanding this, I find that the unit of light as produced in the electric arc (*disintegration*) by any of the four dynamo-electric machines is *at least* fifty times cheaper than the unit of light as produced by combustion, considering the expenditure of power only.

This represents an enormous engineering margin in favour of the electric light.

It is, however, necessary to state that this relation only holds good as long as *one* dynamo-electric machine produces *one* electric light.

The three dynamo-electric machines B, C, and D I found practically equal, *i. e.*, they produce the same quantity of light by the same expenditure of power. Any difference which may be found is entirely within the limits of observation and other errors.

But the dynamo-electric machine A gives a much stronger light for a comparatively smaller expenditure of power.

In round numbers it may be said that dynamo-electric machine A gives about double the quantity of light given by any of the other three machines, and that only about half as much power is expended to produce the unit of light.

This favourable result is principally due to the comparatively small internal resistance of A, and its low speed.

With reference to mechanical construction and regular working, dynamo-electric machine C is highly efficient.

My experiments necessarily have suggested alterations and improvements of the dynamo-electric machines, with which, however, I shall not deal in this précis of the Report.

## II.—CONSTANCY AND REGULARITY OF THE ELECTRIC LIGHT.

This appears to be still the weak point, and many improvements in this respect are possible and desirable.

Although it is not in the nature of dynamo-electric machines to produce a *perfectly steady* current, like, for instance, galvanic batteries, the irregularity of the light resulting from this source can be entirely neglected against those produced by the lamp itself.

I have tried two different lamps :—

(a) *The Serrin Lamp*, as supplied by Messrs. Soutter & Lemonnier, of Paris, and the British Telegraph Manufactory.

(b) *The Siemens Lamp*, as supplied by Messrs. Siemens, Brothers.

The Serrin lamp, for any given adjustment, regulates the length of the arc only in *one* direction, *i. e.*, it diminishes that length.

The actual consumption of the carbon points regulates the length of the arc in the other direction, *i. e.*, increases it.

In the Siemens lamp the decrease of the length of the arc is effected exactly in the same manner as in the Serrin lamp, but the increase in the length of the arc is not only left to the consumption of the carbon points—a comparatively slow process—but is accelerated by the addition of a make and break arrangement, which separates the carbon points.

Hence, from a theoretical point of view, the Siemens lamp is undoubtedly superior, since the length of the arc is rapidly adjusted in both

directions, and consequently the working currents can increase to a very considerable degree without spoiling the dynamo-electric machine.

But practically I find the Siemens Lamp somewhat difficult to manage, and although, when *once* well adjusted, it burns as regularly as the Serrin Lamp, it is far more difficult to arrive at this adjustment.

For practical use I prefer, therefore, the Serrin Lamp, with those alterations and constructional improvements which my own experiments have suggested. I shall not refer to these improvements here.

A second cause of the irregularity of the electric light is the still imperfect state of the carbon points.

They sometimes split, break off, burst, and crumble. Under these circumstances, not even the most perfect lamp will produce a steady light.

Of late some great improvements have been made in the manufacture of artificial carbons, but much more is required; and this point deserves the closest attention. In my final Report I shall treat this subject in detail. With the improvements which I have been able to introduce in reference to lamps, position, form, and nature of the carbons, the electric light (emanating in a line passing through the centre of the arc, and being normal to the axis of the arc) is still exceedingly variable (ranging in intensity during short intervals of time between 1 and 3).

It is true that these variations in the light are flashes lasting for a moment only; but they are nevertheless there, the eye perceives them, and they are disagreeable.

To make the electric light more steady should be considered one of the most important questions to be solved.

### III.—HOW TO PUT UP THE LIGHT—POSITION AND MECHANICAL DETAILS.

To solve this question is of the greatest practical importance.

Two essentially different methods are available:—

*Division of the Electric Light, i. e., to produce by the same electro-motor a number of lights at different points of a given space.*

This method, besides being scarcely solved, appears to be impracticable from an engineering point of view.

Such divisions of the electric light can only be effected by a large sacrifice of total and external light, and moreover this loss increases rapidly with the number of lights burned in the same circuit.

It appears that the electric light can alone compete with light produced by combustion, when produced of great intensity in *one* point by *one* dynamo-electric machine.



Endeavours to cut up the electric light into a large number of small lights, although of great interest, must, I think, invariably result in engineering failure, as nobody could afford to pay for the luxury received.

I have succeeded in working three Serrin Lamps connected up successively in the same circuit of a dynamo-electric machine, but found the loss of light very great.

Having satisfied myself of the difficulty and impracticability of the division of the electric light, I tried :—

*Diffusion*, i. e., a few large lights (each light produced by one machine), are placed at different points of the space, and by optical means the light is diffused over a large area.

This method I find perfectly practicable.

There is naturally also a large amount of light lost (by absorption), but this loss will bear a constant ratio to the total light produced, nay probably may decrease with the intensity.

The actual plan by which I propose to do it, and have done it during the trial, is to construct a *Silvered-glass* reflector in which a powerful electric light burns, throwing *direct* and *reflected* rays up to a white ceiling or any other convenient white surface. A number of such arrangements is to be put up in the most convenient places, and where they have the greatest effect.

The form and size of each reflector will depend on the locality where it is to be used.

In future constructions of railway stations the lighting up by the electric light should be taken into account.

#### IV.—WHAT REPAIRS ARE REQUIRED IN COURSE OF TIME, AND ARE THEY OF SUCH A NATURE THAT AN ORDINARY MECHANIC CAN EXECUTE THEM ?

Any repairs which during this extended trial had to be made were entirely limited to the commutator, and the brushes of the dynamo-electric machines. These repairs were exceedingly simple, and any native mechanic would be able to execute them.

I consider the Commutator or Dynamo-Electric Machines A and B the best.

Practice will however answer this question much more effectively than any experimental trial can do.

The commutators are to be often cleaned, and the brushes are to be well set.

Although the electric lamps look rather formidable, they are nevertheless very simple apparatus, not easily getting out of order if well adjusted.



## V.—ROUTINE; DIFFICULTY OF MANIPULATION AND SUPERINTENDENCE.

Only *one* man is actually required in each station, to take charge of the steam engine, dynamo-electric machine, lamps and reflectors.

This man should be of a rather high intelligence to be able to understand the working of the system, the adjustment of the dynamo-electric machines and lamps.

He should be a skilled mechanic in order to be able to execute the necessary repairs.

A simple Test-Galvanoscope is to be used to gauge from time to time the efficiency of the dynamo-electric machine in producing a current through an external resistance equal to *one unit*.

## APPENDIX I.

GENERAL SPECIFICATION OF A DYNAMO-ELECTRIC MACHINE  
REQUIRED FOR USE IN INDIA  
(*East Indian Railway*).

The dynamo-electric machine to be of the same size and pattern as the one manufactured by Messrs. Siemens, Brothers, of London, under the name, "Medium sized," and which in my report has been called A.

The following alterations of the present construction are to be made :

1. The induction-cylinder to be wound with *twelve separate sections* of wire, instead of with *six*, as at present.

2. The commutator, therefore, to consist of *twenty-four* copper plates, instead of twelve, as at present.

3. The diameter of the commutator to be increased in the proportion of 3 to 4 *at least*. In all other respects to be, however, of exactly the same construction as the present one, which from a construction point of view is *perfect*.

4. Number of brushes, *four*, as at present, with the difference that they should consist of *several* layers of finer wire instead of *one* layer of thick wire as is the case at present. 12 sets of brushes are to be issued with the machine in question.

5. The present adjustment of these brushes (with reference to pressure on the commutator, and relative position to the poles of the electro-magnet) wants some improvements.

It is required for a safe and regular working of a dynamo-electric machine that the adjustment of the pressure of the brushes against the commutator should not only be more *handy*, but also *finer*, and that the adjustment for finding approximately the neutral line of the commutator should be made more *convenient* and *finer*. The proper practical fulfilment of these two conditions is of paramount importance, and if the present

construction should not allow of such improvements, it is worth while to alter that construction somewhat. Further, the insulating material between the brush-holders and moveable collar should be made much thicker.

6. The driving pulley of the dynamo-electric machine should keep its present diameter, but should be made broader in order to be able to use a wider strap for driving. A loose pulley should run on the axis of the induction cylinder.

7. An iron plate must form the separate base of the dynamo-electric machine, and when putting up the dynamo-electric machine this iron plate is fixed either to a beam or to masonry. Along this iron plate the actual bottom plate of the dynamo-electric machine is to slide in grooves, so that it may be fixed in any one position by four strong screws with nuts.

8. The magnetic field in which the induction cylinder moves, should be a *uniform one*.

In the present construction this is *not* the case. The magnetism at the ends is much stronger than in the middle, but it is probable that making the poles of a solid piece of iron would alter this.

This should be tried, and if it answers should be introduced in the present specified dynamo-electric machine.

9. The terminal screws of the dynamo-electric machine should not be *hand screws* as at present, but strong hexagonal-headed screws with lock-nuts, and the outside wires connecting electro-magnets with brushes and induction cylinder should be insulated like the rest of the wire used in the electro-magnets.

10. When the above dynamo-electric machine is delivered, the following statements must be given :—

Total weight, including everything.

Weight of iron used in the electro-magnet.

Weight of iron used in the induction cylinder (not including the axis).

Weight of copper used in the electro-magnet, and

Diameter of wire in millimetres.

Weight of copper used in the induction cylinder, and

Diameter of wire.

Total internal resistance of the dynamo-electric machine, as found by direct measurement through the brushes.

Resistance of the separate coils of the electro-magnet.

Total resistance of the induction cylinder, as found by *direct* measurement.

Resistance of each separate section.

All resistances to be expressed in S. U. and the temperature to be stated at which the measured resistances are right.

As these resistances are all very small, they should be given to 3rd decimal; hence a special bridge for testing must be used.

11. The speed of driving is to be between 700 and 750 revolutions per minute, and at this speed through a known external resistance, the current produced *should not be less* than that given by the following formula:—

$$C = 0.3 \sqrt{\frac{W^1 - w^1}{m + r}}$$

where C is the current in Webers.

$W^1$  the power required per second to produce that current.

$w^1$  the power per second to drive the dynamo-electric machine empty (external resistance infinite, *i. e.*, circuit open).

Both  $W^1$  and  $w^1$  are expressed in Meg Ergs\* per second.

1 Meg Erg = 1,000,000 Ergs.

$m$  is the internal resistance of the dynamo-electric machine, *i. e.*, resistance of electro-magnet plus resistance of induction cylinder plus contact resistance in the commutator as found by direct measurement when *all* brushes are on.

$r$  is the external resistance; both  $m$  and  $r$  expressed in S.U.

When gauging the dynamo-electric machine by the above formula it is best to make  $r = 1$  S.U. *about*.

If the dynamo-electric machine produces less current (say more than 10 per cent. less) then there is something wrong either in the machine or with the measurements. If it is in the machine it may be due to the following causes:—

Brushes make bad contact and do not approach sufficiently near to the neutral line; try therefore a better adjustment; or there is a shunt in the machine which can best be found by driving the machine empty; or the iron is bad, &c., &c., &c.

The actual measurements are to be forwarded with the dynamo-electric machine.

*Note.*—The above formula has been calculated from the experimental fact that at the production of currents above 20 Webers, the loss of power in making current is about 12 per cent. If all the force used for producing current were represented in the external circuit by that current flowing through a known resistance, then the formula would be:—

\*—7460.6 Meg Ergs per second equal *one* Watt's H.P. per second, *i. e.*, 550 foot-pounds per second in London.

$$C = 0.33 \sqrt{\frac{W^2 - w^2}{m + r}}$$

therefore the observed current never can be higher than this value, and this fact gives a criterion for trustworthy observation.

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GENERAL SPECIFICATIONS OF AN ELECTRIC LAMP REQUIRED  
FOR USE IN INDIA (*East Indian Railway*).

The lamp to be constructed on the *Serrin principle*, with the following alterations:—

1. All parts of the lamp, including clockwork, &c., &c., to be made of gun-metal. No steel or iron is to be used except in the electro-magnet and its armature.

Even the axles of the wheels and the fly-escapement must be made of gun-metal.

2. The carbons to be used in this lamp may be of any shape—round, triangular, or square. The carbon-holders should be sufficiently large to hold a round carbon of 18 mm. diameter; and should be constructed in such a manner that they can hold carbons of a much smaller diameter, and also that by the expansion due to heating, the carbons should not become loose in their clamps.

The construction of the carbon-holders in the Siemens lamp appears to be good, and should be adopted in this lamp.

With 18 mm. carbons the lamp should burn 8 hours.

3. The screw for regulating the tension of the spring or springs which act in opposition to the magnetism of the electro-magnet should move 1 mm. by one whole turn.

In order to know the adjustment at any one time, and to be able to make the *same* adjustment again, a millimeter scale is to be attached, by which the movements of the screw can be read. The circumference of the head of the screw is to be divided into ten equal parts. Hence by this arrangement the comparative tensions of the spring or springs can be read up to 0.1 mm.

This micrometer screw, after the lamp has been regulated for any given current varying within two known limits, is to be fixed by a clamp and screw to keep that adjustment *constant*.

4. The distance between the electro-magnet and its armature is also to be made adjustable by a micrometer screw, provided again with millimeter scale like the above, and with a clamp and screw, for making any best adjustment *constant*.

5. The clockwork and all regulating parts of the lamp to be entirely covered by a strong metal case, which is to be constructed in such a manner that it can be taken off or put on without interfering in any way with the adjustment of the lamp. The best, I think, would be to make that case cylindrical, opening like a door in two halves on hinges, and with a key for closing it. There is no limit to the actual size of the case, since the lamp is intended for lighting up by the method of "diffusion" with an opaque reflector, which is placed and begins *above* the cover.

None of the adjustable parts of the lamp are to protrude, as it is intended not to touch the lamp after its proper adjustment, which is done in the laboratory only.

It is quite a mistake to give people easy regulating means. That will never answer in practice. People, as a rule, will turn anything in the opposite direction they ought to do; then they get excited, and the failure is attributed to the lamp instead of to the people.

Each lamp has only *one* best adjustment for any given current varying between two known limits, and the best adjustment is made constant by fixing everything. The case or cover is then closed, and the lamp put up for use.

6. The electro-magnet which pulls the arc should offer no more resistance than 0.02 S.U. It is to be *shunted* by another Electro-Magnet which offers exactly the same resistance (0.02 S.U.)

Hence, one half of the current passes through the electro-magnet of the lamp, and is made use of *for pulling the arc*. The amount of iron used in the electro-magnet, and the number of convolutions should be such, that at the mean distance of the electro-magnet from its armature, the magnetic force is strong enough to produce an arc of 2.5 mm. against the mean tension of the spring or springs when employing a current of about 25 Webers.

The magnetic action of the shunt for the same current should be about double that of the electro-magnet of the lamp, in order to leave a margin for a finer adjustment, *i. e.*, equalization of the magnetic action of the two.

In the foregoing it has been supposed that the shunt does not act on the armature. But it can be easily conceived that the free magnetism of that shunt may be made to assist the electro-magnet for regulating the arc.

I consider it, however, better not to do this, especially when the currents produced are sufficiently strong, above 30 Webers, which will be the case when using a dynamo-electric machine, as described in the first part of this Appendix.

The two electro-magnets, each forming a shunt to the other, are adjusted in such a manner, that the extra currents they produce, when the primary current varies, are equal, and therefore, as they are invariably opposite to each other, they neutralize one another entirely, which will have the desired effect of a quicker regulation of the lamp for any variation of current.

The iron used in the shunt should have double the weight of the iron in the electro-magnet.

The section of the wire for filling the shunt should be double the section of the wire filling the electro-magnet.

Coil on so many convolutions on to the shunt until its resistance becomes equal to the resistance of the electro-magnet.

For adjusting the equality of the extra currents the following method should be adopted:—

Form a Wheatstone bridge two sides of which are formed by a mercury-rheostat, each side offering about 0.02 S.U. resistance. The third side of the bridge is formed by the electro-magnet of the lamp, the fourth side by the shunt. In one diagonal place a dynamo-electric machine and about *one unit* resistance, together with a convenient make-and-break contact, best done by a mercury cup. In the other diagonal, place a Bell-telephone of lowest possible resistance. One end of this diagonal can be moved along the mercury-rheostat. Start the dynamo-electric machine, listen to the telephone and alter the ratio of the mercury-branches of the bridge, by shifting along the contact until the telephone is perfectly silent.

Then if, at commencing and stopping the current a strong click is heard, we know it is due to the two extra currents not being equal, and as we further know that the shunt produces the greatest extra current, we make this extra current smaller, by shifting along the two poles of the shunt, an iron wedge until the telephone is quiet, when starting and stopping the current. The iron wedge is then fixed in its position.

This shunt is also to be *inside* the metal cover of the lamp.

7. The two terminals of the lamp are to be of exactly the same pattern and size as those used in the dynamo-electric machine described in the commencement of this Appendix.

They must *not* be terminals with hand screws.

### APPENDIX III.

#### ON SOME OF THE SCIENTIFIC RESULTS OBTAINED BY EXPERIMENT.

SYSTEM OF UNITS ADOPTED:—In my investigations I have adopted the *Centimetre-Gramme-Second* system of units.



(Illustration of the Centimetre-Gramme-Second (C.G.S.) system of units, by J. D. Everett.)

In Appendix I.\* attached to the Report, all the required data are given for easy reference.

#### MEANS OF MEASUREMENT:

*The Tangent Galvanometer* which is described in Appendix (II) of the Report.

By means of this instrument, constructed in special manner to suit the particular purpose, all the currents between 1.6 to 38 webers could be measured very accurately.

The currents, in absolute measure, may be taken as correct within 3 per cent. *at least*. The Astronomer Royal most kindly gave me the value of the horizontal component of the earth's magnetism at Greenwich.

*The Photometer* described in Appendix III. The comparison of two lights by means of this instrument rests on the following principle:—

Two surfaces, equal in size and nature, are placed side by side, quite close together, and in the same plane.

One surface is illuminated by one light, the other surface by the other light.

This is best done by using two equal flint-glass prisms.

The surfaces towards the eye are covered with tracing paper, the top half of each paper being divided by fine pencil lines into small squares.

The equalization of the intensities of the two lights under comparison is done by keeping the distance between the two lights *constant*, and moving the two illuminated surfaces *within* that constant distance.

This Photometer is particularly well adapted for comparing the intensities of two differently coloured lights.

An experienced eye can easily distinguish the relative distinction between the pencil line and the back ground of each surface, and if this relative distinction is the same in both surfaces, the two surfaces have equal intensity, no matter what the colour of each light may be. However, as a rule, the comparison of any two lights was made by observing the two surfaces through a *red glass*. This glass, after trying a great variety of glasses, was found to have the convenient quality of making the colours of the electric light and of the standard light equal.

It was ascertained that this red glass absorbs all the violet, blue, and green rays, letting through only some yellow, more orange and all the red.

\* All the Appendices referred to in the following belong to the actual Report, of which the present paper is a Précis only.



Hence if the two lights under comparison contain the different coloured rays in different proportions, it may be said that by adjusting balance by means of the red glass, the ratio must become erroneous.

However, actual experiments proved that this is practically not the case. If there is a difference it is quite within the limits of errors caused by the considerable variation in the intensity of electric lights.

Two electric lights compared with each other by means of the red glass and without it, gave practically the same ratio.

Further, the same electric lights compared each with a standard light (either a standard-candle or a platinum-light standard, to be described further on), and by adjusting balance through the red glass gave a ratio sufficiently close to the one found by direct comparison of the two electric lights. I can therefore recommend this photometer for practical use.

*The Dynamometer*, described in Appendix (IV). When transmitting force by means of a strap from a *driving* pulley to a *driven* pulley, it will be noticed that that side of the strap which runs *towards* the *driving* pulley has always a greater tension than the other side of the strap which runs *from* the *driving* pulley.

This difference of tension in the two sides of the same strap is proportional to the force transmitted, a well and long recognised fact. The difference of tension is measured either by a graduated spring or weight, and hence the force can be calculated if the *constant* of the dynamometer is known.

From this and the speed the power consumed per second can be calculated. Dr. C. W. Siemens called my attention to this very simple, convenient, and accurate method of measuring force transmitted and power consumed. It is a method not to be found in any text-book, and was first suggested and employed by Mr. Hefner von Alteneck, of Berlin.

A drawing to scale of the dynamometer, as actually made, is attached to Appendix IV.

*The measurement of speed.* See Appendix V. In this investigation, where almost all results depend on the speed of the induction cylinder, it becomes a matter of importance to select the proper apparatus for measuring that speed accurately.

I have employed three essentially different instruments:—

*The Pocket-Counter*—an instrument well known and extensively used.

*The Mercury Speed Indicator* by J. M. Napier. The speed is measured by a column of mercury, which increases its length when the speed increases. It is a most convenient instrument.

*The Cycloscope*, this is another very ingenious instrument for mea-

suring the speed continuously, and is an invention of Lieut. G. S. Clarke, R. E., and Professor McLeod.

The principle of the cycloscope consists in employing a tuning fork or reed as the standard by which to measure velocities of rotation. The instrument is described in the Proceedings of the Royal Society, 1877, Vol. XXVI.

*Resistance measurements.* See Appendix VI.

An ordinary Wheatstone bridge with S.U. has been employed.

By careful comparison I find,

$$1 \text{ B.A.U.} = 1.0509 \text{ S.U.}$$

The resistance measurements are all correct within 0.01 S.U.

*Standards of Light employed.* See Appendix VII.

*The Standard Candle.*

The Metropolitan Gas Act of 1860 defines the Standard Candle as follows:—

“Sperm candles of six to the pound, each burning 120 grains an hour.”

To keep the flame of a candle at exactly the same position in the photometer, a condition required for accurate photometric measurements, I place the candle in a closely fitting tube against the top rim of which a spring presses the burning candle.

*The Platinum Light Standard (P.L.S.)*

The unit of light is defined, as the light emitted from a piece of pure platinum weighing ( $x$ ) grammes and having the most convenient shape and size, when a constant current of ( $y$ ) webers passes through it.

The current can be easily kept constant by a convenient battery, and by inserting in the circuit a galvanoscope and adjustable mercury-rheostat. The deflecting wire of the galvanoscope should consist of one thick copper wire only. On the galvanoscope the point is marked off which corresponds to a current of ( $y$ ) webers.

This Standard produces a light of perfect constancy, so long as the current is kept constant, and further allows a correction to be made if the variation of the current is known.

It is further a standard which can be reproduced very accurately anywhere, and its magnitude may be altered to any extent to suit certain practical purposes, by simply varying the elements of the weight, shape and size of the platinum, or the strength of the current passing through it.

It does not alter in itself. Hence the Platinum Light Standard fulfils all the conditions of a good standard, and I therefore propose it should be used in future as the standard of light in England, in lieu of the standard candle.

## RESULTS.

*Economy of Electric Light.*

The energy of the standard candle was ascertained by *direct experiment*. See Appendix VIII.

It was found that the standard candle, in order to produce the unit of light, does work at the rate of 610 meg-ergs per second, *at the least*.

In fact it is highly probable that the standard candle, in order to produce the unit of light, works up to more than double that amount (1265 meg-ergs per second).

Further, by direct experiment, it was ascertained that the unit of light, as produced in an electric arc, by any one of the dynamo-electric machines under trial, and through a leading wire offering not more than 0.1 S.U. resistance, is produced at the rate of not more than 20 meg-ergs per second, including *all the work transmitted*, and the light measured in a line which passes through the centre of the arc, and stands normal to its axis. Hence the probable engineering margin in favour of the electric light is between 30 to 70, or equal to a mean of 50.

Dynamo-electric machine A produces the unit of light at a rate of not more than 10 meg-ergs per second.

Hence it may be safely asserted that the electric light produced by dynamo-electric machines is as an average 50 times cheaper than light by combustion.

This is, however, true only as long as the light is produced in *one* arc.

If more than one light is produced in the same circuit by the same current the external or available light becomes rapidly dearer with increase of the number of lights produced.

For this reason already, if not for many others, the *division of light* must result in an engineering failure.

It is in the nature of the electric light that it should be used in *great* intensity in *one point*, instead of small intensities in *many* points.

For the experimental details and complete information on this interesting point. See Appendix IX.

*Current produced by Dynamo-Electric Machines.* See Appendix XI.

These currents, as the insertion of a bell-telephone (used as a shunt) will easily prove, are *not steady*.

The dynamo-electric machine with the greatest number of sections in the induction cylinder gives the steadiest current. Twelve sections I find *necessary* and *sufficient*.

*Influence of Speed.* See Appendix X.

The current produced by any dynamo-electric machine through a given constant total resistance in circuit increases permanently with the speed of the induction cylinder.

This increase of current for low speeds is more than proportional to the speed; afterwards it becomes proportional; and for high speeds the increase of current is less than proportional to the speed.

The current has, however, no maximum for any speed, but reaches its greatest value at an infinite speed.

This same law, as the total resistance in circuit is supposed to be constant, of course holds good also for the electro-motive of the dynamo-electric machine.

*Influence of External resistance.* See Appendix XII.

Keeping the speed constant, the electro-motive force of any dynamo-electric machine decreases rapidly with increase of external resistance.

This decrease is more rapid, the smaller the internal resistance of the dynamo-electric machine is made.

Hence the currents must decrease much more rapidly than proportional to the total resistance in circuit.

As in the case of speed, the electro-motive force has no maximum for a certain external resistance, but approaches permanently its greatest value for an external resistance equal 'Nil.'

It appears that the function which connects E. M. F. and speed, is the same as that which connects E. M. F. and external resistance.

We have only to substitute for speed the inverse of resistance and *vice versa*.

*Maximum work by a current in the resistance R.*

As the current decreases much more rapidly than the total resistance in circuit increases, this resistance R should invariably be made *smaller* than the remaining resistance of the circuit, *i. e.*, smaller than the internal resistance of dynamo-electric machines plus resistance of leading wires.

See Appendix XI and the special proof attached.

*The Electro-motive force of a Dynamo-Electric Machine as a function of the resistance and speed.*

It appears that the following two formulæ are most probably correct for *all* Dynamo-Electric Machines, if the loss of current by transmission is taken into account:—

$$E = \kappa \left\{ 1 - e^{-\left(\frac{a}{m+r}\right)^2} \right\}$$

E the E. M. F.

m the internal resistance, and r the external resistance, including resistance of leading wire.

$\kappa$  and  $\alpha$  are independent of  $m$  and  $r$ , and are functions of the speed of the induction cylinder, and contain also the construction coefficients.  $e$  is the basis of the natural logarithm.

Further:—

$$E' = \kappa' \left\{ 1 - e^{-\left(\frac{v}{\alpha'}\right)^2} \right\}$$

$E'$  the E. M. F., and  $v$  the speed of the induction cylinder.

$\kappa'$  and  $\alpha'$  are independent of  $v$ , and are functions of  $m$  and  $r$  only.

These two functions,  $E$  and  $E'$ , correspond to all the characteristics of the curves found by experiment, and they also fulfil the limit conditions.

In Appendices IX and X, the question has been gone into fully.

*Resistance and Electro-motive force of the Electric arc.*

There appears to be no doubt that an appreciable E. M. F. in the arc is established which acts in opposite direction to the electro-motive force of the dynamo-electric machine.

This E. M. F. of the arc *increases* with the current, passing through the arc.

The resistance of the arc for constant length is also a function of the current passing through it, *i. e.*, the resistance of the arc *decreases* with the current, see the following table:—

Current in Webers.	Resistance of the Arc in S.U.	E.M.F. of the Arc in Volts.
28.81	0.91	2.02
23.87	1.72	1.91
16.27	1.97	1.86

See Appendix XI. The E.M.F. in an electric arc, opposite to the electro-motive force of the dynamo-electric machine, constitutes another reason against the unlimited divisibility of the electric light.

*Regularity of the production of Currents by Dynamo-Electric Machines at different periods.*—If the brushes are well set, and if they are placed as nearly as possible in the neutral line of the commutator, the production of current is perfectly regular, and measurements taken through the same external resistance at the most distant periods agree most perfectly with each other, supposing the correction for variation in speed and internal resistance are applied.

Disregarding the heating of the dynamo-electric machine by the current, the time required to arrive at dynamic equilibrium, *i. e.*, when

force transmitted, current and magnetism received are constant, is very short indeed, especially for the strong currents, which alone are made use of for lighting.

*Formula for controlling the Test-results.*—As the power which is represented by the measured current working through a given resistance can never exceed the original power transmitted to the machine, we can, from current, resistance, and force measurements, frame a formula which checks the probability of the results.

This formula is :—

$$C \leq 0.33 \sqrt{\frac{W'-w'}{r+m}}$$

$W'$  is the *total power* consumed by any dynamo-electric machine when producing the observed current  $C$  in a circuit of resistance  $r + m$ .

$w'$  is the power consumed by the dynamo-electric machine when producing *no current* (*i. e.*, driven empty; circuit open; external resistance infinite).

$r$  is the external resistance, and  $m$  the internal resistance.

In the above formula  $C$  is in webers,  $W'$  and  $w'$  in meg-ergs per second, and  $r$  and  $m$  in S.U.

Of late, exaggerated statements of the performance of dynamo-electric machines have been made, the absurdity of which would have become evident at once if the above formula had been applied as a check to the results.

*Co-efficient of transmission.*—If all the work ( $W'-w'$ ) were transformed into *available* current in the external circuit then :—

$\frac{W'-w'}{W}$  = unity, where  $W$  is the total work performed by the observed current in the circuit of known resistance.

In practice it will be found however that  $\frac{W'-w'}{W} > 1$  (for many reasons).

This expression,  $\frac{W'-w'}{W}$ , I have called :—

The *co-efficient of Transmission* and designated it by the letter  $\kappa$ .

$\kappa$  is different for the different dynamo-electric machines, which have been tried, and decreases with increase of current.

Producing currents above 24 webers, the following average values of  $\kappa$  have been obtained :—



Name of Dynamo-Electric Machines.	$\kappa$	Average Current in webers.
C	1.01	31.0
A and B	1.12	31.0
D	1.28	27.9

*Co-efficient of Efficiency.*

$$\epsilon = \frac{w}{W' - w'}; \text{ } w \text{ is the useful work done in the circuit by the current.}$$

As the resistance of dynamo-electric machines and leading wires cannot be made "nil," this co-efficient must be always smaller than unity.

For currents above 24 webers we have :—

Name of Dynamo-Electric Machine.	$\epsilon$	Average Current.
A	0.62	29.5
B	0.53	31.0
C	0.47	32.6
D	0.30	27.9

Hence the dynamo-electric machine A converts 62 o/o of the total energy transmitted into useful work, while 38 o/o is lost in heating the machine.

Dynamo-electric machine D converts 30 o/o of the total energy transmitted into useful work, and loses 70 o/o in heating its own wires.

*Practical Mechanical Equivalent of the currents produced by Dynamo-Electric Machines.*

$$\eta = \frac{W' - w'}{C} \text{ where } C \text{ is the current in webers.}$$

Above 24 webers, the different dynamo-electric machines produce the weber at the following consumption of power :—

Dynamo-electric machines A and B produce one weber at 686.5 meg-ergs per second.

Dynamo-electric machine C produces one weber at 736 meg-ergs per second.



Dynamo-Electric Machine D produces *one* weber at 920 meg-ergs per second.

N. B.—Through certain external resistances which are sufficiently small to get currents above 24 webers.

*Regularity of the Electric Light—*

If the resistance external to the dynamo-electric machine is represented by the resistance of the arc only, *i. e.*, resistance of leading wires equal "Nil," then although the light is naturally the most powerful, it is the least steady, since any variation of the resistance of the arc has then evidently the largest influence on the current and on the light.

By connecting across the electro-magnet of an electric lamp, another electro-magnet which acts as a shunt, and adjusting the two electro-magnets in such a manner that they produce *equal extra currents* when variations in the primary current take place, the regularity of the working of the lamp is greatly enhanced.

(See Specification of Lamp, Appendix I, of *Précis of Report.*)

An electro-static shunt will have a similar effect. *For strong lights* or *strong currents*, the electro-magnetic shunt is best; for *weak lights* or *weak currents* the electro-static shunt is best.

The lamp should be constructed mechanically so well and delicately that the carbon points run together with a minimum tension of the spring of the lamp. Then the lamp will be a balance with small weights.

When making photometric measurements, to get more trustworthy results, it is best to use a *flat carbon* (2 to 3 mm thick) as the positive electrode, and a carbon of the usual form as the negative electrode.

The light is to be observed in a line normal to the flat surface of upper carbon, and passing through the centre of the arc. In this manner the largest quantity of *total light* produced is measured, and, moreover, the ratio between *total* and *external* light is more constant.

The lower carbon should be invariably of less section than the upper carbon.

Further, when producing the light by a short arc, which it is always advisable to do, the lower carbon should be *natural* carbon. Coppering the carbon is advisable under all circumstances. Artificial as well as natural carbons appear to be very little hygroscopic, a great fortune for damp climates like India during the monsoons.

When the arc is long, the flame by combustion of the carbons is large.

This appears to be due to the fact that for a long arc the vacuum formed round the carbon points by expansion of the air by heat is less complete than in an arc of shorter length.

The consumption of the carbon points is due more to combustion than to disintegration.

The incandescent part of the carbon points has so much more intensity of light than the flame that the latter causes a shadow.

The hissing noise produced by the electric arc is, I believe, due to the formation of a vacuum round the incandescent carbon points.

The noise is much stronger in a short than in a long arc. It may also be due in part to the disintegration of the carbon points. The noise of the electric light in a quiet room is simply unbearable. This speaks only *against* the use of the electric light for domestic purposes.

There can be no doubt that one length of arc is best under given circumstances, considering both the intensity and regularity of the light.

The light permanently decreases with length of arc, hence the arc should be made as short as possible. This would, however, be bad for the constancy of the light, and may also spoil the dynamo-electric machine. Hence adjust the commutator by turning the brushes in the direction of the rotation until only small sparks are observed.

If this is impossible make the arc longer by lessening the tension of the spring.

In this manner the best length of arc can be experimentally found.

This would give the best tension of the spring at the starting point. Now let the dynamo-electric machine run for several hours, and make the same experiments, when the best tension of the spring will be found somewhat less. Take the mean of the two tensions and fix the micrometer screw.

#### *Proportionality of light and current—*

Although the light produced in the arc must be very nearly proportional to the total energy consumed in the arc (minus the energy expended in giving the disintegrated carbon particles velocity), the resistance of the arc decreasing with increase of current, it follows that the light *cannot* be proportional to the square of the current.

If we make the highly probable supposition that the resistance of an arc of constant length is inversely proportional to the current which passes through, then the light produced would be proportional to the current.

This appears to be the case.

The conduction of the arc appears to be due to two causes, rarefied air and carbon particles flying in both directions.

Both causes would point towards an *inverse* proportionality between current and resistance of arc.

There are many other novel points of great interest to be discussed, and many more practical and scientific results, I have no doubt could be

elucidated from my experiments, but unfortunately, I must conclude here, since I have to start for India in a few days.

The completion of the results shall, however, be given in my final report which is in preparation.

3.—*On new species of the Genus Plectopylis of the family Helicidæ.*—*By* LIEUT.-COL. H. H. GODWIN-AUSTEN, F. R. G. S., F. Z. S.

(Abstract.)

In this paper the author describes three new species:—one (*Helix (Plectopylis) brachydiscus*) from Tenasserim among a collection of shells made by Mr. O. Limborg, of which a list is being prepared; the other two (*Helix (Plectopylis) Oglei* and *Helix (Plectopylis) brahma*) from Eastern Assam.

The paper will be published in the Journal, Part II, with a plate.

4.—*Hemiptera from Upper Tenasserim.*—*By* W. L. DISTANT. *Communicated by* J. WOOD-MASON.

(Abstract.)

The author in this paper enumerates and describes the *Hemiptera*, collected by Mr. Ossian Limborg in the district east of Moulmein, Tenasserim, and placed in his hands for determination by Mr. Wood-Mason. Among the insects described, the following are new species, *Sminthus marginellus*, *Platyplema insignis*, and *Huechys thoracica*.

The paper will be published, with plate, in the Journal, Part II.

5.—*Statement of Earthquakes that occurred during 1878, in the Province of Assam.*—*Communicated by the* CHIEF COMMISSIONER OF ASSAM.

This paper has been received from Mr. H. F. Blanford in continuation of former lists, and will be published in the Journal, Part II.

6.—*Addenda to further notes on Kálidása.*—*By* M. A. GRIERSON, C. S.

(Abstract.)

This paper consists of extracts freely translated from the *Bhoja Prabandha*, a work which contains various anecdotes concerning the court of King Bhoja, related by one Vallála. The work has been edited by Paṇḍit Jibánanda Vidyasagara of Calcutta. Only three of the most interesting anecdotes are given in the paper. The first narrates how Kálidása introduced himself to the king's notice by an ingenious explanation of an apparently unreasonable act of liberality on the part of the king. The king once presented a certain poet Sankara with 12 lakhs of Rupees, which roused the jealousy of the other courtiers; but Kálidása pacified them by the

remark that of the twelve lakhs only *one* was given to the poets, but the eleven others to the 11 Rudras, who are the visible forms of the god Sankara or Siva. On another occasion when some paṇḍits who were skilled in the Vedas, but no adepts in verse-making, were at their wit's end to complete a couplet, with which they wished to ingratiate themselves with the king, Kālidāsa supplied the rest. The third anecdote illustrates the great ascendancy which the poet Kālidāsa had gained over the king's mind; so that the king did not dare to remove him from his court, although he was greatly dissatisfied with his dissolute mode of life, wherein he was supported by his queen, and although his courtiers contrived by an intrigue to get Kālidāsa turned away, the king remained inconsolable, until he had succeeded in re-discovering and bringing back Kālidāsa, who henceforth stood higher than before in the king's favour.

7.—*On the Norwegian Tatars, their language and its relation to Hindi.*  
—By Dr. SUNDBERG.

(Abstract.)

The Tatars are the gipsies of Norway. An account of them has been published by Mr. Eilert Sundt in his work "*Beretning om Fante-eller Landstrygerfolket i Norge.*" "The notices of them in the present paper are principally taken from it. The name "Tatar" has been identified with *Tatar ततार*. Dr Sundberg suggests a new derivation, from *ṭha-ṭhiār* (a brazier; Hindi *ṭhather*); because one of their occupations is working in brass and other metals. Though outwardly professing the religion of Norway, they really have their own religion; they worship the moon, and call their god *Dundra*, which Dr. Sundberg identifies with *Devendra देवेन्द्र* or the god Indra. It used to be a practice among them to tie a stone round their neck and drown themselves when they thought they had lived long enough. They state their original home to have been the city of *Assas* in *Assaria* which has been identified with Assam; and its aboriginal tribe of the *Doms* is said to have given to their language its name *Romani*. Dr. Sundberg adverts to a story of the Persian poet Firdusi, that the king Behramgur of Persia requested king Kanodsche (Kanouj) of India to send him some musicians; and that the latter sent 12,000 musicians and dancing girls. These are said to have spread all over Europe and are the gipsies, Tatar etc.; and Dr. Sundberg points out that in the Punjab the musicians, who accompany nautch-girls, are called *Dom*. There is a small vocabulary of about 800 words added to Mr. Sundt's book, from which Dr. Sundberg gives a few examples of words of apparently Hindi origin; *e. g.*, *jana* to know, *jido* living, *ka* to eat, *kalo* black, *lon* salt, *meros* mine, *pani* water, *pansh* five, *per* belly, *pi* drink, *baro* great, *bersh* rain, *besha* to sit, *brasha* to rain, *de* to give, *deros* thy, *dikka* to see, *dives* day, *dui* two, *ratti* night, etc. There are also a few Russian and Finnish words which

are explained by the Tatars having come to Norway through Russia and Finland. In Norway they are said to have first appeared in the 16th century.

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LIBRARY.

The following additions have been made to the Library since the Meeting held in February last.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR APRIL, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 2nd instant, at 9 P. M.

W. T. BLANFORD, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed:—

The following presentations were announced—

1. From E. T. Atkinson, Esq., Statistical, Descriptive and Historical account of the Bijnor District,—by H. Conybeare, B. C. S., edited by E. T. Atkinson, Esq., B. A.

2. From E. Thomas, Esq., F. R. S., a copy of his paper,—On the Position of Women in the East in olden time.

3. From the Madras Government,—Index to sixty-two MS. volumes deposited in the Government Oriental MS. Library.

4. From the Chandernagore Pustakágár,—Report on the Chandernagore Pustakágár.

5. From Messrs. L. Schwendler and R. S. Brough, Instructions for Testing Lines, Batteries and Instruments; and Guide to the Technical Arrangement of Telegraph Offices in India, Vol. II.

6. From the India Office Library, Codices Indici Bibliothecæ Regiæ Havniensis.

7. From Commander A. D. Taylor, Superintendent of Marine Surveys, Chart of Ratnagiri.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected Ordinary Members—

The Right Rev. the Lord Bishop of Calcutta.

A. C. Lyall, Esq., C. S. (re-elected).

Babu R. Saran Dass, M. A.

The following are candidates for ballot at the next meeting—

J. W. Muir, Esq., c. s., proposed by H. Rivett-Carnac, Esq., c. i. e., seconded by Captain J. Waterhouse.

J. Schroder, Esq., proposed by Dr. A. F. R. Hoernle, seconded by Captain J. Waterhouse.

A. Smidt, Esq., proposed by Dr. A. F. R. Hoernle, seconded by Captain J. Waterhouse.

C. J. Sheridan, Esq., c. e., proposed by H. Rivett-Carnac, Esq., c. i. e., seconded by Captain J. Waterhouse.

The SECRETARY announced that Mr. W. Mackay had intimated his desire to withdraw from the Society.

The SECRETARY reported that J. Westland, Esq., had been appointed a member of the Finance Committee.

The SECRETARY reported that H. H. the Lieutenant-Governor of Bengal had been pleased to appoint the President and Natural History Secretary of the Society to be *ex-officio* Members of the Committee of Management of the Zoological Garden at Alipore.

The SECRETARY reported that 63 pieces of stone sculpture, brought from Gaya by Dr. Rājendralāla Mitra, c. i. e., had been transferred to the Indian Museum under the provisions of Section 12, Act XXII of 1876.

The following is a list of the stones :

Nos. 1 & 2. Impressions of human foot.

3. A column.

4. A standing figure of Padmapāni.

5. A model of a native Temple.

6—9. Copings of Asoka rails (two with inscriptions).

10—19. Bases of Pillars.

20. A Lintel.

21—29. Chaityas of various sizes.

30, 31, 32. Asoka rail-bars.

33—37. Friezes, with rows of human figures.

38—61. Pinnacles of Chaityas.

62 & 63. Bricks from one of the radiating arches in the Buddha Gaya Temple.

The SECRETARY reported the purchase of 38 silver coins out of a collection submitted to the Society under the Treasure Trove Act. Dr. Rā-



jendralála Mitra, c. r. e., had kindly examined them, and made the following notes upon them :

"The collection comprises 126 coins, representing two of the later Pathán Sovereigns of Delhi, and four of Bengal. The former include Sher Sháh and Islám Sháh, and the latter Naçrat Sháh, Hussain Sháh, Muhammad Sháh, and Sikandar Sháh. The bulk of the trove is made up of the coins of the two Delhi emperors, and includes several varieties. I have selected for the Society the following 38 coins, *viz.* :—

No.

- |     |             |   |                               |  |
|-----|-------------|---|-------------------------------|--|
| 1.  | Sher Sháh.  | Circular area on both sides, and Nágari name on the margin. | date H. 949, wgt. 174 grains. | No. 179 of Thomas' Pathán Coins.         |
| 2.  | Ditto       | H. 949.   | C. wgt. 172 grs.              | New.                                     |
| 3.  | Ditto var.  | H. 949.   | "                             | 169 grs., not figured by Thomas          |
| 4.  | Ditto       | H. 940.   | "                             | 174 grs. ditto                           |
| 5.  | Ditto       | H. 948.   | "                             | 175 grs. ditto                           |
| 6.  | Ditto,      | double-line square area.                                    |                               | wgt. 171 grs. New.                       |
| 7.  | Ditto,      | single-line square area.                                    | H. 914                        | " 167 grs. New.                          |
| 8.  | Ditto,      | single-line circular area.                                  | H. 949.                       | " 168 grs.                               |
| 9.  | Ditto ditto | ditto.  | H. 950.                       | " 168 grs.                               |
| 10. | Ditto ditto | ditto.  | H. 951.                       | " 170 grs. Figured in T. P. Coins, 348a. |
| 11. | Ditto,      | double-line circular area, small size,                      | H. 949.                       | wgt. 169. grs.                           |
| 12. | Ditto,      | single-line square area                                     | H. 946.                       | " 170 grs.                               |
| 13. | Ditto       | ditto ditto   | H. 948.                       | " 170 grs.                               |
| 14. | Ditto       | ditto ditto   | H. 949.                       | " 173 grs.                               |
| 15. | Ditto       | ditto ditto   | H. 951.                       | " 171 grs.                               |
| 16. | Ditto       | ditto ditto   | H. 947.                       | " 170 grs., new.                         |
| 17. | Ditto       | ditto ditto   | H. 948.                       | " 169 grs., new.                         |
| 18. | Ditto       | ditto ditto   | H. 951.                       | " 170 grs., new.                         |
| 19. | Ditto       | ditto ditto   | H. 952.                       | " 170 grs., new.                         |
| 20. | Islám Sháh, | son of Sher Sháh, small size                                | H. 951.                       |  |
| 21. | Ditto       | ditto ditto   | H. 952.                       |  |
| 22. | Ditto       | ditto ditto   | H. 953.                       |  |
| 23. | Ditto       | ditto ditto   | H. 954.                       |  |
| 24. | Ditto       | ditto ditto   | H. 955.                       |  |
| 25. | Ditto       | ditto ditto   | H. 956.                       |  |
| 26. | Ditto       | ditto ditto   | H. 957.                       |  |
| 27. | Ditto       | ditto ditto   | H. 959.                       |  |
| 28. | Ditto       | ditto ditto   | H. 960.                       |  |
| 29. | Ditto       | ditto large size  | H. 954.                       |  |

} all these  
are of one  
type.

} Type of 344  
of Thomas.

- |     |  |         |
|-----|--|---------|
| 30. | Islám Sháh, son of Sher Sháh, large size,                | H. 955. |
| 31. | Ditto ditto ditto  | H. 956. |
| 32. | Ditto ditto ditto  | H. 958. |
| 33. | Ditto ditto ditto  | H. 959. |
| 34. | Ditto ditto ditto  | H. 960. |
| 35. | Muhammad Sháh, with name in Nágari, no date, new.        |         |
| 36. | Sultán Jalál-uddin Muhammad Sháh, no Nágari, no date.    |         |
| 37. | Bahádur Sháh, son of Muhammad Sháh, with name in Nágari. |         |
| 38. | Ditto ditto ditto.                                       |         |

"No. 20 is worthy of special note, as it contains a date which cannot be reconciled with the history of Islám Sháh. The *Tarikh Daudi*, quoting the *Tirikh Akbar Sháhi*, says, "when Sher Sháh rendered up his life to the angel of death in Kalinjar, Jalál Khán, his youngest son, was in the town of Rewán, in the province of Bhata, and his eldest son 'Adíl Khán, the heir-apparent, in the fort of Ranthor (Ranthambhor). The nobles perceived that 'Adíl Khán would be unable to arrive with speed, and as the State required a head, they despatched a person to summon Jalál Khán, who was nearer. He reached Kalinjar in five days, and, by the assistance of 'Isa Hajjáb and other grandees, was raised to the throne near the fort of Kalinjar, on the 15th of the month Rabi-ul-awwal, 952 A. H. (25th May, 1546, A. D.) He assumed the title of Islám Sháh, and this verse was engraved on his seal :

"The world through the favour of the Almighty, has been rendered happy,  
Since Islám Sháh, the son of Sher Sháh, has become king."\*

"If this record be right, Islám must be accepted to have succeeded Sher Sháh in the middle of 952, immediately after the death of his father. How comes it that we have coins bearing date 951, and describing him as a Sultán, son of Sher Sháh? In Mr. Thomas' excellent monograph of the Pathán Kings of Delhi, mention is made of a coin of Islám Sháh bearing date Ranthambar 951 H., and the type of that coin is the same with that of the above list, but the inconsistency in the date has not been noticed. It is impossible that the father and the son could reign at the same time, unless a revolt of some kind be admitted, and such a revolt or rivalry for the empire between the father and the son has nowhere been mentioned by Muhammadan writers. The son, acting in subordination to the father, would have struck the rupees in his father's, and not in his own, name. Moreover he was not the rightful heir, and could not succeed except by superseding his eldest brother. My own reading of No. 20 I accept with diffidence, but Mr. Thomas' unrivalled knowledge of Indian numismatics and Semitic palæography leaves no room for doubt that the reading is cor-

\* *Apud* Elliot's Muhammadan Historians, IV, p. 478.

rect, and the only solution that I can offer of the difficulty is that the second son was striving for the empire even from before the death of his father, and was not only in open revolt, but had gone the length of proclaiming himself the Sultán, and of putting in circulation coins bearing his name a year before his father's death, and that the Muhammadan historians have glossed over this part of his career. The only objection to this solution would be the tender age of the youth, but that would be removed if it be assumed that he had been set up by some disaffected grandees of his father's court."

The SECRETARY reported that, with the consent of the Subscribers, the sum of Rs. 273-7-0, balance of the Stoliczka Memorial Fund, had been transferred to the Asiatic Society's Servants' Pension Fund.

The SECRETARY read the following letter from Prof. J. de Goeje, dated 20th January, 1879, requesting help in obtaining subscribers for the publication of the Great Arabic Annals of Tabari, and said that he would be glad to receive the names of members who had already subscribed or wished to subscribe.

"Permit me to explain why I take the liberty of addressing you. In 1875 a consortium of Orientalists resolved to undertake the publication of the great Arabic annals of Tabari. Though there was not known a single manuscript of the whole work, still several libraries possessed parts of it, from which it would be possible to restore the text. To get these volumes copied or collated, a relatively considerable sum of money was required, and a good number of subscribers was thought necessary to cover the costs of printing. I addressed myself for support to many promoters of science and had not bad luck. I had great expectations from India and was not disappointed. Dr. Blochmann wrote to me that it would be easy for him to procure me 60 subscribers, and Dr. Rájendralála Mitra told Prof. Sprenger in a letter of earlier date, that Dr. Blochmann had already a dozen names on his list, and that he himself had a few more. Now by the illness and subsequent death of Dr. Blochmann, this most promising correspondence has been broken off, and I never received the list of subscribers, which Dr. Blochmann had given himself so much trouble to collect. I was at a loss to whom I might address myself for information, when Mr. A. Grote emboldened me to appeal to your kindness. So now I venture to recommend to you the interests of our undertaking, and to ask for your help in promoting them."

"The first half volume of Tabari is nearly printed and will be published within two months."

Dr. HOERNLE exhibited facsimiles of three inscriptions and a statuette sent by Mr. Rivett-Carnac, and read a note by Dr. R. Mitra on the same. The inscriptions are incomplete and of not much value. They are intended for Sanskrit, but both the language and orthography are corrupt. The first, of seven lines, is from Bhojpur, near Fatehgurh. It is now built into a wall, face inwards; but this is not its original place; for it was put up to record the making of the approaches to a bridge, in some locality not named. According to the record, this was done during the reign of Sultan Sikandar, son of Behlul Lodi, by one Buddhana, son of Bajbal Euradi, of the race of Bahlím. It also mentions one, Khan Dagdan. The names cannot be identified. The date is Samvat 1548 (A. D. 1491). The second, of two lines, in Kutila characters, partly illegible, contains the names *Vāsava Dūmudaka* (for *Damodara*?). It is from a stone at Kanauj, apparently the top of a pillar; without date. The third, from the remains of a sandstone figure, containing only ten Sanskrit letters and a monogram, is illegible. Date Samvat 1580 (A. D. 1523). The statuette is a small black sitting figure. The pose according to Dr. Mitra is that of Buddha in ecstasy, and is well known. Mr. Rivett-Carnac takes it to be a Jain figure. The symbol of the hooded snake engraved on the base, and the black colour of the figure, perhaps, indicate it to represent Parsvanátha. There is an inscription in modern Nágari all round the base, of which, however, only the date Samvat 1548 (A. D. 1491), the 6th of the waxing moon in the month of Vaisákha, and the words *pranamati sadgurum, i. e.,* "he salutes the true guru" can be made out.

Dr. HOERNLE read the following description of the gold coins found by Mr. W. Simpson in the Ahin Posh Tope at Jalalábád, exhibited at the last meeting.

There are altogether 20 coins, two (Nos. IX and XIII) contained in a small gold reliquary, the other 18 loose. They are all of gold, of small size, about  $\frac{3}{4}$  inch wide, and about 2 drams in weight. They are of two different classes, 3 are Roman, the other 17 Indo-scythian. The latter are of three different reigns, of Kadphises, Kanerki and Hverki. See Plates II and III.\*

#### I. INDO-SCYTHIAN COINS.

##### A. *Coins of Kadphises.*

There are altogether ten of these; they are of two sorts; (1) such as bear the bust of king Kadphises on the obverse, and a standing human figure on the reverse; (2) such as have the same obverse as the former, but on the reverse bear a human figure standing by the side of a standing bull.

(1.) These again are of two kinds, in some (a) the head of the bust is turned to the left; in the others (b) it is turned to the right.

\* It has been decided to have these plates produced in England by the Autotype photo-mechanical process, as being far superior to lithography. Some delay will therefore arise before they can be issued.—Ed.

(a.) Of this kind there are five specimens :

No. I *Obverse*—Figure of king to the front, head turned to the left, with a thick closely cut full-beard (in most specimens so much abraded as to give the appearance of a beardless face,) dressed in a coat and a low Tartar cap with fillets and frontlet, in the right hand a mace or short club, leaning on the shoulder ; monogram (No. 1, on table III, Pl. I.) behind the head ; below the bust and all round it the inscription.

*Reverse*—Naked standing male human figure turned to the front ; head to the right ; apparently leaning back with the left elbow on some invisible support, hid by a skin thrown over the left lower arm ; in the left hand a short club, right hand raised and resting on a spear which is surmounted by a trident and combined half way down the staff with an axe ; hair done in a cone on the top of the head. Monogram double, on right and left (table III, Pl. I. Nos. 2, 3) ; inscription running all round.

No. II. A duplicate of No. I.

No. III. *Obverse*—Like that of No. I, except the head-dress being a high Tartar cap, like those given in Wilson's *Ariana Antiqua*, Pl. X, 7, 8, 13.

*Reverse*—Like that of No. I.

No. IV. and No. V. duplicates of No. III.

(b.) Of this kind there are three specimens :

No. VI. *Obverse*—Bust of king to the front ; head turned to the right ; dressed in Tartar coat and high cap with ordinary fillets and frontlet ; in the right hand a mace carried erect ; monogram behind the head ; inscription below and around the bust.

*Reverse*—Like that of No. I.

Nos. VII, VIII, and IX duplicates of No. VI.

Of Nos. I and II no specimens are given by Wilson in his *Ariana Antiqua*. Nos. I and II are in a good state of preservation ; Nos. VII and VIII are fairly good ; the rest are very much worn ; especially Nos. III and V which are for the most part effaced.

#### *Explanation.*

(1.) *Figures.* Alike on all coins I to VIII ; the bust on the obverse evidently a portrait of king Kadphises ; features Tartar ; very heavy, especially in the lower part of the face. The figure on the reverse very closely resembles that on the reverse of the coins of Kadphises or Kadaphes under Su-Hermaeus. On the latter coins it is a figure of Hercules in the conventional posture, as seen, *e. g.*, in the well-known *Ercole Farnese* in Naples. It is a naked standing Hercules, to the front, slightly reclining on his left elbow ; the lion's skin hanging over the left lower arm, and the Hesperide apple in the left hand ; the right hand resting on his club, the butt end of which is on the ground (see Wilson's *Ariana Antiqua*, 309,

Pl. 5, 8, 9, 10). The same figure is also found on coins of Hverki (see Ed. Thomas' *Jainism*, p. 61, Pl. II, 2). On the present coins the figure is the same, but the attributes of Hereules are exchanged for those of Siva; his *triṣṭula* or three-pronged spear (combined with his axe, as in the tridents of Barahat and Gopeshwar, see Wilson's *Ariana Antiqua*, 350), taking the place of the club; his tiger skin (in Indian representations wrapt round the loins, but here thrown over the arm to resemble Hereules) replacing the lion's skin; his noose or the *khinkin* (the object is not quite distinct) the apple, and the spiral coil of hair on his head the curly hair of Hereules.

(2.) Inscription alike on all 8 specimens.

*Obverse*—The legend is in Greek language and Greek characters; on the left ΒΑCΙΑΕΥC οοΗΜο, on the right ΚΑΔΦΙCΗC, below the bust ΜΙFΑC; *i. e.*, βασιλευς οοημο-καδφισης μεγας, *i. e.* "king Hvemo-Kadphises the Great." The word *μεγας* has hitherto not been read, though it was already remarked by Wilson (*Ariana Antiqua*, pp. 354) that the lower part of the bust had the appearance of characters. The appearance of letters, indeed, is too unmistakeable to allow them to be taken as only parts of the dress. But owing to the fact that the letters are here cut at a higher elevation than in the rest of the legend, level with the bust itself, they have in most coins suffered so much abrasion as to be almost unrecognisable. There are, however, in the present collection two coins (Nos. I and II) on which the letters are in a sufficiently good state of preservation to permit an attempt at identification. I take them to be *migas*, where 'i' is either a mistake for 'e' or only badly cut. It should be observed (see Wilson's *Ariana Antiqua*, 355—357, Pl. XI) that both on the silver and the copper coins of Kadphises the word *megas* is not only part of the inscription, but occurs precisely in the same place below the bust.

*b. Reverse*—The legend is in the Pāli language, and in what has been called the Bactrian or Arian-Pāli characters. It must be read from the right to the left; commencing at the top of the left side of the coin. It consists of 33 letters, see Pl. I. table I. The whole, with the exception of the last seven letters, is distinctly visible on coin No. I. The deficiency is supplied by No. II, on which the second half is distinct. By the help of these two specimens, therefore, the whole of the legend can be made out with tolerable certainty. On the others it is more or less imperfect. Nos. III and V are quite useless. On the rest the middle of the legend is generally readable and available for comparison. But though the form of the letters is assured, their value, for the most part, is not so. That of the first eleven is certain; it is *Maharajasa rajadhirajasa*. The next is *sa*; 13 is unknown; 14 and 15 are *loga*;



16 is either *i* or *sta*; 17 is unknown; 18 and 19 are *rasa*; 20 and 21 are *mahi*; 22, 23 and 24 are the same as 17, 18 and 19; 25 and 26 appear to be *hima* or *hima*; 27, 28, 29, and 30 are *Kadphisasa*; 31 is unknown; 32 and 33 are *dara*. There are various helps to determine the probable meaning of the legend. In the first place, it has been found that, as a rule, the Pāli legend on the reverse is a more or less accurate translation of that on the obverse. In the present case the legend on the reverse is much too long to be such a translation. But the same legend occurs also on the copper coins of Kadphises which have a much longer Greek inscription, viz., *basileus basileôn sôtir megas himo-Kadphisis*; and it can scarcely be doubtful, that the Pāli legend is the equivalent of the longer Greek series (see Wilson's *Ariana Antiqua*, 350). Now *maharajasa rajadhirajasa*, "of the great king, the king of kings" is evidently intended to represent *basileus basileôn* "king of kings." The words *hima-kadphisasa* "of Hima-Kadphises" occur in both Pāli (letters 25—30) and Greek. The remainder, therefore, of the Pāli legend ought to be the equivalent of *megas* and *sôtir*. In the second place, the Pāli legend is in the genitive case, which ends in *sa*. The same termination *sa* occurs twice again in letters 19 and 24, which shows that the letters intermediate between *rajadhirajasa* and *hima* (*i. e.*, 12 to 24) consist of two groups, each containing an epithet of king Kadphises. There is a third group of letters (31—33) following Kadphises. It can hardly be doubted that this also contains an epithet of the king. In that case it ought to terminate with *sa*. I have no doubt that it was intended to end so and that the letter was simply omitted for want of space; the letters of the inscription being already packed so closely as to leave no room for an additional one. On coin No. X, letter 16 is similarly omitted. Again the unknown character 30 I take to be *tra*\*; for *r* is marked by adding a stroke to the right foot of the letter (see Cunningham, *Corpus Inscript. Ind.*, 49), which, without this stroke, is the usual character for *t*. The whole group, then, must be read *tradarasa* or *trádārasa*, "of the saviour," the regular Pāli or Apabhramsa-prākṛit equivalent of the Sanskrit *trātuh* (see Hema Chandra 3, 44) and the Greek *sôtir*. This reading is confirmed by the fact that the Arian Pāli as well as the Ap. Prāk. like to retain an *r* (see Cunningham C. I. I., 43 and H. Ch. 4, 398). The Greek *sôtir* being thus accounted for, the remaining Greek word *megas* ought to be the equivalent of the remaining two groups. The simple Pāli translation of *megas*, as it

\* Since writing the above, I have discovered in the Shahbāzgarhi rock inscription (towards the end of the IIIrd edict, see Cunningham C. I. I., Pl. I) and on some of the coins of Hermaeus (see Wilson A. A., Pls. IV and V) a character for *tra*, very closely resembling this one.



occurs on other coins, is *mahatasa* (= Prák. *mahantassa* or *mahattassa*). Here, of course, it cannot be taken as translated, but is paraphrased and expanded. The unknown letter 22 resembles the Arian Páli character for *ṣ*; but there is a curve added to the right foot, which may indicate the combination of another consonant with *ṣ*; such combinations being not uncommon in Arian Páli (see Cunningham C. I. I., 49). Now the only possible conjunct here is *ṣv*; so that the whole group (20—24) must be read *mahiṣvarasa*, which I take to stand for the Sanskrit *maheṣvarasya* “of the great lord,” with *i* for *e*, as in the Prákrit *devindo* for Sanskrit *devendrah* (see H. Ch., 3, 162). Again the group (22—24) *ṣvarasa* re-occurs in 17—19. The group 14—15 is *loga*. The intermediate letter 16 must therefore be *i*, to give any sense at all. No. 13 is generally valued as *va*, so that the whole group 12—19 would be *savvalogaiṣvarasa*, which I should take to be equal to the Sanskrit *sarvalokaiṣvarasya* “of the supreme in the whole world.” In this way, this and the other group together would give a fulsome paraphrase of the Greek *meḡas* “the Great.” The explanation of the last two groups is substantially the same as that given by Thomas in his *Jainism* (p. 59) where, however, the author of it is not mentioned. The word *logaiṣvarasa* is not = Sanskrit *lokeṣvarasya*, as Thomas has it, but is equal to *lokaiṣvarasya*, for Sanskrit *e* would not dissolve into *aĩ*, whereas *ai* does (see H. Ch., 1, 151, where the very word *aĩsariam* for Sanskrit *aĩṣvāryam* is given as an example). However, the form of 13 in the group is, by no means, the usual form of *v*, as may be seen by a reference to the alphabets in Wilson, Prinsep, and Cunningham. It is doubtful, therefore, whether the correct value has been assigned to it. It looks like a conjunct, the two parts of which somewhat resemble the characters for *g* and *d*, and may therefore be *gda*. In that case, the whole group (12—19) would read *sagdalogaiṣvarasa* “of the sovereign of the Sagda people.” The Sagdās might then be identified with the Sogdians who are spoken of by the Greek historians as one of the Scythian tribes. It should be also noticed that the letter 25 is not the usual one, as we have it, *e. g.*, in 21. I take it to be a compound consonant, made up of *h* and *v* with the vowel *i* and to be the equivalent of *hvi*, so that the whole group 25, 26 must be read *hviṃa*. This corresponds exactly to the Greek *οοῖμο* (*oóimo*). That the Greek *o* may stand for *v* is shown by *oado* for *váto* (see Wilson, A. A., 362), and that it may also represent the aspirate *h*, by *oóirki* for *hvirki* (see p. 134). The latter is the name of the king who is otherwise known as *huvishka*. Here *huvi* is rendered in Greek by *οοη* (*oói*), the same as in *οοῖμο* (*oóima*). Now *η* is rendered in the Arian-Páli of the present coin by the vowel sign for *i*. Hence the accompanying Arian-Páli consonant must represent the Greek *oo*, and must be equivalent to *huv* or rather *hv*.—Of the concluding group of the Páli legend, I am not

aware of any explanation having been given hitherto. Wilson (A. A., 258), indeed, notices the true interpretation which I have given above, but only to reject it.

(2.) Of this kind there is only one specimen.

No. X. *Obverse*—Exactly like that of No. I. On the back of the head very long hair, flowing down to the shoulders, is distinctly visible, reminding one somewhat of the long hair of the modern Afghans.

*Reverse*—The figure principally differs from that on the reverse of No. I by the addition of a bull which stands behind the human figure. The latter closely resembles that of No. I in general posture; the left elbow on which it reclines is supported on the hump of the bull; the right hand, as before, resting on a three-pronged spear which, however, is only half as long as in No. I and rests with its lower end on the back of the bull; it also wants the axe. But the tiger's skin is absent and the left hand is empty. Instead of the coil of hair, the head is covered with a bell-shaped helmet or bonnet, reaching to the shoulders behind, surmounted by three prongs or rays, and with a lobe on each side. The face is turned to the front, not to the right, as in No. I. A chaplet of balls is hanging over the left shoulder and reaches down to the hips. The figure is naked and is that of a woman, as shown by the general configuration of the body. The bull is standing with its head seen on the left side of the woman; his horns arranged so as to form a regular crescent; a cloth is thrown over his back so as to nearly reach to the ground. There is only one monogram (No. 5 on table III), not two as on No. I; and it is the right side one of No. I, which is here on the left side of the coin (the right of the figure). Inscription round the whole circumference.

What distinguishes this coin from all the others of the Indo-Scythian class is the superior sharpness, a miniature-like clearness, with which both the figures and the inscriptions are cut. It is also in a very fair state of preservation; only a small part of the rim being worn away on one side.

#### *Explanation.*

(a.) *Figures.* That on the *obverse* requires no explanation, being the same as on No. I; but instead of the mace there is a short club, and the fillets are Sassanian.

*Reverse*—The attributes are those of Śiva; his vehicle, the white bull or nandi; his *triśūla*; his chaplet of skulls, the *munda mālā*; the bell-shaped head-dress perhaps signifies the Ganges, flowing from his head. As the figure is that of a woman, it is probably meant for Parvati, the wife or female form of Śiva. On some coins the figure is said to be hermaprodite (see Wilson's *Ariana Antiqua*, 351). In that case it would repre-

sent *arddhanariṣvara*, the half male, half female form of Śiva. "The housings of the bull are such as may still be seen upon the Indian bull that is led about by mendicant Jangamas" (see Wilson's *Ariana Antiqua*, 351).

(b.) *Inscriptions.* *Obverse*—The legend is the same as in No. I, but the form of some of the Greek letters is cruder as may be seen by a reference to Pl. I, table II.

*Reverse*—The legend is identical with that of No. I, but there is a slight difference in the tracing of some of the letters (4, 7, 10, 12, 15, 32), as will be seen by a reference to Pl. I, table I. In 13 and 15 the relative position of the loop is exactly reversed. In 4, 7, 10, 32 an ornamental stroke is added to the foot of the letter. 16 is entirely omitted. The last and the first letters of the legend are, for want of space, made to run into each other; thus fully accounting for the omission of the final *sa*.

### B. *Coins of Kanerki.*

Of these there are altogether six. Among them there are only two that are quite alike, so that there are five different kinds according to the form of the figure on the reverse.

1. No. XI. One specimen only. *Obverse*—Standing figure of the king to the front, head to the right, with long straight full-beard, dressed in a close-fitting frockcoat or tunic, closed in front, in *pajamas*, and clumsy (boots or) shoes, much broader at the toes than at the heels, also in a mantle thrown over the shoulders and held by a button in front, the sleeves of which are seen flying out on both sides behind the arms. (Wilson, *Ariana Antiqua*, p. 358, takes the latter to be a bow carried on the back; but on none of the present specimens does it at all look so; he was misled by the outline of the sleeves being drawn too straight and stiff in some cases). On the head there is a crown or helmet, consisting of a parallel trapezium, with the narrower side below, with the royal fillet attached, and surmounted by a dome and above it a trident. It is probably the same crown as in No. XVII, though it is too much abraded to clearly distinguish minor points of detail. The right hand, pointing downwards, holds a hook or *ankusa* over a very low object, standing beside the right foot; the left hand is raised and rests on a spear. Attached to the waist-band (only distinguishable on No. XII) there is a short sword, protruding on the left side. The whole figure closely resembles one on some coins of Kadphises of which there is no specimen in the present collection, but drawings of which may be seen in Wilson's *Ariana Antiqua*, Pl. X, 12, 14, 21. [They differ in the features and beard; in those of Kadphises there is a high Tartar cap on the head (as, however, also in Nos. XII—XIV);

the tunic is worn open in front, so as to allow the tie-strings of the *pajamas* to be distinctly seen; the sword is wanting; there is added a monogram (the same which in the present coins appears on the reverse); a mace or short club replaces the spear, but not carried in the (left) hand which is placed on the hip; a trident and axe (combined as in No. I) replace the hook, but again not carried in the (right) hand which is empty and points downwards to the unknown object.] Inscription on both sides, but not below the feet and above the head; between the feet, along the rim, a series of dots.

*Reverse*—Standing male figure with large pendent ears and a large tuft on the top of the head, dressed in a long robe reaching to below the knees; parts of the dress (apparently a neckerchief) are hanging over both arms which are in elbow-position, the right one turned inwards with its hand on the breast, the left turned outwards with its hand holding some round object (a lotus); a circular nimbus round the head, another elliptical one round the rest of the body, both meeting at tangents behind the neck; monogram on the right of the coin (No. 6 on Pl. I, table III); inscription on the left; a series of dots all round the rim.

This coin is well executed and in a very fair state of preservation. It appears to be unique, as being the only *gold* piece found hitherto with the figure of Buddha on the reverse, and the *only one* on which the name of Buddha is distinctly *legible*. All those known hitherto are "*copper* pieces of imperfect execution, whose legends are absolutely chaotic in the forms and arrangements of the Greek letters," (see Ed. Thomas' *Jainism*, p. 79.)

*Explanation.* (a.) *Obverse*—Figure. Likeness of Kanerki; head and features easily distinguishable from those of Kadphises. Head of the latter thick and broad, of the former more elongated; features here sharp, there heavy; beard long and straight here, there short and thick. The low object at the foot of the king is very like a miniature of the large fire-altar, represented on the reverse of the Sassanian coins (see Wilson's *Ariana Antiqua*, Pl. XV, 3, XVII, 13, 14). Hence the king is generally supposed to be represented in the act of sacrificing on a Mithraic altar.

*Inscription.* In the North-western or Arian Pāli language and in Greek characters; on the left of the coin PAoNANo PAo KA, on the right NHPKI KoPANo, *i. e.*, *paonano rao kanhaki korano*. The corresponding legend on No. XIV is βασιλεὺς βασιλεων κανηρκου; and it cannot be doubtful that the Pāli legend is but a translation of the Greek one. *Raonano rao*, therefore, must be the equivalent of *basileos basileōn* and mean "king of kings." And, in fact, *rāo* is the regular Prākṛit nominative singular of *rājā* king (see *Sīṅha Rājā*, fol. 20, H. Ch., 3, 49, 56). It still occurs as a title of Hindu princes. Again *rānāna* (or *rānānam*) is the regular Prākṛit genitive plural "of kings" (see H. Ch. 3, 56). Strictly

the Greek *παοαυο* represents a Prākṛit form *rāṇāna*; but the shortening of the second *a* may be a local peculiarity. As a rule the Pāli does not observe the later Prākṛit rule of eliding medial consonants (here *j*), as may be seen from the Pāli legend on the coins of Kadphises. But the adoption of it by the Western or Arian Pāli in the case of the title *Rājā* is also proved by the Shāhbāzgarhi rock inscription of Asoka, which has *rajo* instead of the *rājā* and *lājā* of Girnar and Dhauri. The approximation of the Western Pāli to the later Prākṛit is also shown by the use, in the former, of the Prākṛit form *baraya* "twelve" (see Cunningham, C. I. I., pp. 42, 67 and Vr. 2, 14 *barāha*), instead of the ordinary Pāli *duvadasa*. The word *rāonāno* has not hitherto been fully understood. Prinsep took it as two words *rāo-nāno*, and explained *nāno* as the Sanskrit *nānā* "repeatedly." Wilson and after him Lassen also divided the word, but into *raonā-no*, interpreting *raonā* as the plural of *rāo*, and *no* as the genitive affix of the Gujarāṭi. But it may be doubted whether the documentary use of that affix is so old. Kanerki is the name of the king, and is supposed to be identical with *Kanishka* of Kashmerian history. The word *korano* has not yet been satisfactorily explained. Perhaps the identification of it with the Greek *koiranos* "chief," especially a "military chief" (as Masson and Wilson, see *Ariana Antiqua*, 78, 358, and Ed. Thomas' *Jainism*, p. 20), is after all the most plausible. The use of an old Greek word need not surprise, for there are also other signs of a Greek revival in the time of king Kanerki in the use of Greek deity-names (see also Ed. Thomas' *Jainism*, p. 8). Lassen takes it to be a Greek corruption of *kushana*, expressing some title (see *Ind. Ant.*, Vol. II, p. 389). The whole legend then would mean: "the king of kings, Kanerki, the war-chief."

(b.) *Reverse*—The figure is that of Buddha as shown by his posture and attributes and the inscription. The posture of preaching or blessing, the tuft of hair on the top, the large ears and the lotus characterise the figure too clearly to be mistaken (Wilson's A. A., 363), and this is confirmed by the inscription which is in Greek characters ΒοΔΔο, *i. e.*, *βοδδο* or *buddha*.

2. No. XII. One specimen only. *Obverse*—Figure and inscription like that on No. XI.

*Reverse*—Standing male figure; general posture resembling that on the reverse of No. I, but left arm a-kimbo with hand on the hilt of a short sword, protruding on the left side; right arm extended straight, with apparently all the fingers of the hand closed except two; dressed in a long thin robe and pallium; a rayed nimbus, with fillets, round the head. Same monogram as on No. XI, but on the left of the coin (No. 7 on Pl. I, table III); on its right the inscription; a circle of dots all round, but a little off the rim.



Explanation. *Obverse*—As in No. XI.

*Reverse*—The figure is supposed to represent the Persian Sun-god, *Mithra*. This is indicated by the filleted nimbus of rays and the inscription which is in Greek characters ΜΙΗΡΟ, *i. e.*, *μυρο*. This appears to be a local form of *mihiro*, in modern Persian *mihir*, a corruption of *mithra*. In western Páli and Prákrit *mithra* would regularly turn into *midhiro* or *mihiro*. On some other coins of this kind the word is found spelled *miaro* (= *miharo*) or *mithra*.

3. No. XIII. One specimen only. *Obverse*—Figure and inscription as on No. XI, only the sword is wanting, but probably only worn off, and the head-dress appears to be a high Tartar cap rather than a helmet or crown.

*Reverse*—Standing male figure; general posture and dress exactly as on No. XII. Here the left hand seems to rest on two swords instead of one; perhaps they are large pincers, if the figure be rightly interpreted as Vulcan. In the extended right hand a scroll; something like flames issuing from behind both shoulders; on the head which is full-bearded, apparently a low cap with fillet. Monogram as on No. XII. On the right side the inscription. A circle of dots originally round the circumference, but about one-third worn away.

Explanation. *Obverse*—As in No. XI.

*Reverse*.—The legend is in Greek characters ΑΘΡΟ, *i. e.*, *αθρο* which has been conjectured by Prinsep to be the Zend word *atars* or *athro* "fire," and to represent the god of fire (Wilson's A. A. 362) or Vulkan (Ed. Thomas' *Jainism*, p. 76), indicated by the pincers, if that be the indistinct object.

4. No. XIV. One specimen only. *Obverse*—As on No. XIII, except that here the hook also is wanting, and the dots between the feet of the figure; but both apparently worn off.

*Reverse*.—Standing male figure; general posture as in No. XII; left arm a-kimbo, with hand resting on the hilt of a short sword and holding a long staff surmounted by a ball, below which four streamers are attached to it. The staff is held across the body, so as to touch the left shoulder and form an X with the body; the right arm extended, having all the fingers of the hand closed except two (apparently the second and the middle fingers). On the head there appears to be a cap or diadem (much effaced) with fillets, from under which thick hair protrudes. What has been above described as streamers are possibly the continuation of these fillets. The head is enclosed between the crescent of the moon projecting from the shoulders. Monogram as in No. XII. On the right side the inscription. Circle of dots originally round the circumference, but about one half worn away.

**Explanation.** *Obverse*—Figure and legend as on No. XI, except that the legend is in the Greek language; on the right of the coin ΒΑΣΙΛΕΥΣ ΒΑΚΙ, on the left ΑΕΩΝ ΚΑΝΗΡΚΟΥ, *i. e.*, βασιλεὺς βασιλεῶν κανηρκου, meaning "the king of kings Kanerkou." The title *korano* is omitted, apparently only for want of space, the Greek legend occupying more room than the Páli one. The termination *ou* of the name seems to be only a græcified form of the Páli *i*.

*Reverse*—The figure is clearly that of the moon-god. This is shown by the attribute of the crescent on the shoulders, as well as by the legend in Greek language and Greek characters ΣΑΛΗΝΗ, *i. e.*, σαλήνη "moon," though it is wrongly spelled with *a* for *ε*. As the figure is male, it is meant for the *Deus Lunus* as seen on the coins of Asia Minor (see Wilson A. A., 360). The figure very closely resembles that of the Sun-god (or Apollo), as seen on No. XII; the principal difference being the crescent here for the rayed nimbus there.

This coin also is unique and is the most important of the collection, being, so far as I am aware, the only specimen, known hitherto, which has the legend *selene*. All those, known hitherto, of a like kind, *i. e.*, bearing similar figures on the obverses and reverses, have Páli legends, *viz.*, on the obverse *raonano rao etc.*, on the reverse *mao* (see Wilson A. A., Pl. XII, 1, 13). The latter has been rightly identified with the Zend *mao* and Sanskrit *māsa* "moon" (see Wilson A. A. 360). The present specimen is their exact Greek counterpart. Those coins of Kanerki which bear on the reverse the legend *nanaia* should not be confounded with these. *Nanaia* is the Persian Artemis and her figure is very different. It is that of a woman, with quite different attributes and without the crescent (see Wilson's A. A., Pl. XI, 17). The Páli counterparts of the *nanaia* coins bear the legend *nana* or *nano* (see Wilson, Pl. XII, 2, 12).

### 5. *Two Specimens.*

*a.* No. XV. *Obverse*—Figure and inscription exactly as on No. XI.

*Reverse*—Figure, slightly effaced, the same as on No. XVII, where it will be described. Monogram as on No. XII; on the right of the coin the inscription; circle of dots along the rim, slightly worn.

**Explanation.** *Obverse*—Figure and inscription as on No. XI.

*Reverse*—The legend is in Greek characters οΗΡΟ. It has generally been taken to be *okro* (*okro*, see Wilson's A. A., 361), but, I am persuaded, wrongly. It is *oiro* (*oiro*). The second letter is a corrupt form of *η* (No. 22 on Pl. I, table II). The same corrupt form also occurs on the obverse in the name *Kanérkou* where it undoubtedly stands for *η*. The letter *κ* occurs



three times on the obverse and is always distinctly K (see Pl. I, table II). In fact in all coins of Kanerki, having a Páli legend,  $\eta$  is uniformly distinguished in this way from  $\kappa$ , as may be seen by comparing Nos. 19, 22, 24 with No. 33 on table II. The corrupt form for  $\eta$  already occurs in No. X, of Kadphises. It is only on the Kanerki coins with a Greek legend (as in No. XIV), that  $\eta$  appears in its proper form H; but in these, too, K is always K, while the corrupt form of  $\eta$  does not occur at all (see Nos. 20 and 34 on table II). It may be observed that Nos. 18, 19, 21 are evidently the intermediate form between Nos. 17, 20 and Nos. 22, 23, 24. The legend  $\sigma\pi\sigma$  I would identify either with *víra* or with *híra*;  $\sigma$  standing both for *v* and for *h* (see p. 126). *Víra* (for the fuller form *vírabhadra*) as well as *híra* are, according to Játádhara, names of Śiva. The figure is that of Śiva, as shown by his attributes of the *triṣúla*, drum, noose and deer. Usually he has only two hands, but in the *dhyána* or religious meditation of the daily worship and frequently in the shastras he is represented with four. The attributes in such four-handed representations of Śiva vary very much. Usually the two lower hands are in the attitudes of blessing and giving; in the upper hands are a trident and thunderbolt, or trident and noose, or thunderbolt and drum, or axe and deer, or trident and skull, (see Moor's *Hindu Pantheon*, and Radha Kanta Deva's *Sabdakalpadruma*). Sometimes there is an object in each of the four hands, as noose, red lotus, skull and trident. The combination of objects represented on the present coin I do not remember to have met with elsewhere.

b. No. XVI. A duplicate of No. XV.

In the coins of Kanerki a further step is observable in the corruption of the form of the Greek letters, see Pl. I, table II. The corruptions occurring in No. X of Kadphises continue. Additional are the two corrupt forms 44, 45 for N. The only exception is the coin No. XIV which has a legend not only in Greek characters but also in the Greek language. Here the letters are of superior make, see table II; especially N and H and A are well made.

C. *Coins of Hverki.*

Of these there is only one specimen.

No. XVII. *Obverse*—Bust of king; general posture like that of No. VI; to the front, head to the right; on left cheek thick, pendent whiskers (as in Wilson's A. A., Pl. XIV, 1; perhaps intended for cheek plates, as in Pl. XIV, 3. and Ed. Thomas' *Jainism*, Pl. II. 14); chin and lips shaven; dressed in coat of mail; on the head a crown or ornamental helmet (as in Wilson's A. A., Pl. XIV. 2), consisting of a circular band, studded with jewels and surmounted by a dome, which has on its side a crescent or circle,

partly effaced, and on its summit something like a trident or flower; double frontlets and fillets; in the right hand an iron-bound mace carried erect; in the left a sceptre (apparently a stalk with flowers and leaves, as in Wilson's A. A., Pl. XIV, 1). Inscription on the right and left of the coin; below the bust some ornamentation, taking the place of the legend of No. VI; the monogram, on the left (No. 8 on Pl. I, table III), differs from those of Kadphises and Kanerki.

*Reverse*—Standing male figure; general posture as in No. XI, to the front, head to the right; upper part of body naked, with a chaplet of balls round the left shoulder; the lower part dressed in ordinary Brahminical *dhotie*; hair thickly matted, and done into a knot on the summit; nimbus round the head; four arms each with two armlets, one at the wrist, the other above the elbow; in the upper right hand an Indian drum, in the lower a hook or *ankusa* and a sort of sceptre (held cross-wise); in the upper left hand a long *triśūla*, held cross-wise (like the staff in No. XIV); in the lower, placed nearly a-kimbo, a short noose, by which he is leading after him an animal. The latter in Nos. XV and XVI looks very much like a deer or goat. On the present coin long bristling hair is distinctly visible on its body. It is very small, standing below the angle of the lower left arm, and (in Nos. XV, XVI, though not in No. XVII) looks as if rising towards the figure on its hind legs. Monogram and inscription as in No. XV. Circle of dots along the rim.

Both as regards execution and preservation this is a very good specimen. The Greek characters generally resemble those on the coins of Kanerki, see Pl. I, table II. But N appears in the still ruder shape 46 and hardly distinguishable from 21 for H. Nos. 44, 45 evidently are the forms intermediate between 42 and 46.

*Explanation.* *Obverse*—The inscription is the same as on Nos. XI to XVI, only substituting *οσηρκι* for *κνηρκι*; thus on the right *ΠΑΟΝΑΝΟ ΠΑΟ* ο; on the left *οΗΡΚΙ ΚΟΠΑΝΟ*; i. e., *παοναο παο οσηρκι κοπαο* "the king of kings, Hvirki, the warrior-chief." The Greek *οσηρκι* represents the name of king *huvishka* (see Ed. Thomas' *Jainism*, pp. 11, 12) and must, therefore, be read *hvirki* (see p. 126) or *hverki*.

*Reverse*—Figure and inscription as in No. XV.

## II. ROMAN COINS.

These are of three different reigns; of Domitian, Trajan, and Hadrian; one specimen of each.

### 1. *Domitian.*

No. XVIII. *Obverse*—Bust of emperor, with legend *AVGVSTVS DOMITIANVS*. Circle of dots round the rim.

*Reverse*—Figure of Minerva, to the front, head to the right ; in long robe ; with plumed helmet ; spear in left arm, and shield on the ground, leaning against her ; right arm raised and holding a thunderbolt. Legend GERMANICVS COS XV. Circle of dots.

No specimens with this figure on the reverse are mentioned by Akerman, *Roman Coins*, pp. 200, 201. Those he gives have either the emperor in a quadriga or a recumbent Germany.

## 2. *Trajan.*

No. XIX. *Obverse*—Bust of emperor. Legend IMP CAES NER, TRAIANO OPTIMO AVG GER DAC, *i. e.*, (the Emperor Cæsar Nerva Trajanus the Best, the August, the Conqueror of Germania and Dacia). Circle of dots.

*Reverse*—The emperor seated on an estrade upon a cross-legged stool, with two soldiers standing beside him on the estrade, one on each side ; in front of him on the ground three men, full-bearded, apparently naked, excepting a skin (?) thrown over the shoulders ; the foremost of them lifting his arms in an attitude of prayer. Legend REGNA ADSIGNATA. No circle of dots, apparently worn off.

This is a rather common coin ; specimens in gold, silver and copper are mentioned by Akerman, *R. C.*, pp. 217, 221.

## 3. *Hadrian.*

No. XX. *Obverse*—Bust of the empress Julia Sabina, wife of the emperor Hadrian, married to him about A. D. 100, died by poison about A. D. 137. Profile to the right of the coin, with diadem, and one short plait reaching to the shoulders. Legend SABINA AVGVSTA. Circle of dots almost invisible ; the rim considerably indented and worn.

*Reverse*—Figure of Juno to the front ; head to the right ; in long robe and pallium ; with outstretched right hand presenting a wreath or crown ; the left resting on a long staff ; peacock standing on the ground on her left, in profile, his head turned up to her. Legend IVNONI REGINAE. Circle of dots, &c., as on obverse.

Mentioned by Akerman, *R. C.* p. 250.

### *Historical Notes.*

1. *Age of the Tope.*—The latest of the Roman coins is that of Hadrian's wife, Sabina. She died about A. D. 137. This limits the time backwards. Some time must be allowed for the wear and tear of it, and also for its travelling to Afghanistan. The construction of the Tope therefore cannot be placed earlier than the 3rd century A. D., nor, as the Indo-scythian coins show, can it probably have been much later. The Roman coins were put in

as curiosities, but the Indo-scythian coins must have been deposited as those current in the country. The notice by the author of the *Periplus* that in his time, the end of 1st century A. D., the drachms of Menauder and Apollodotus, two Indo-grecian kings who reigned from about 150—100 B. C., were still current at Baroach on the coast of Gujarat (see Wilson's A. A. 281), gives an approximate limit of about 200 years, during which the coins of a king may be supposed to have remained current. Of the three Indo-scythian kings, whose coins have been found in the Tope, the two later ones are Kanerki and Hverki. They are generally placed in the first half of the first century A. D. Adding to this 200 years for the currency of their coins, the forward limit of time for the construction of the Tope would be the first half of the third century A. D. It is a noteworthy fact, that no Bactro-Grecian coin has ever been found in any Tope (see Wilson's A. A., 43); nor any Indo-Grecian, except of the last king of that line, Hermaeus, whose rule was subverted by the Scythian prince Kadphises in the first century B. C.; while foreign coins are often met with in them in conjunction with native ones. The omission cannot be well explained otherwise but by supposing (as Wilson A. A., 44), that they had ceased to be current at the time when the Topes were erected. It follows, then, that the coins which are found in the Topes must have been placed in them, as being contemporary and current, whether native and common (as the Indo-scythian) or foreign and rare (as the Roman).

2. *On Kadphises*.—The kings Kanerki and Hverki are admitted by all to be later than Kadphises, and placed in the first half of the first century A. D. As to Kadphises, it is commonly thought that there were two rulers of that name, one in the beginning, the other towards the end of the first century B. C.; and the present coins of Kadphises are ascribed to the second of that name. Some even distinguish a third one, called Kadaphes, a contemporary of the first Kadphises (so Lassen). The subject is involved in much obscurity, owing to the data, which we have, being in part not easy to understand, in part difficult to reconcile. So far as I can judge them, there does not appear to be sufficient ground to distinguish three or even two men. The coins of the (so-called) first Kadphises and of Kadaphes are all of copper and badly preserved. The reading of their legend is by no means assured. Even if it were so, the two names are not sufficiently unlike to preclude the identity of the persons to whom they belonged. As regards the two Kadphises, the evidence, such as it is, rather seems to me to point to their unity. For (1) there is a striking resemblance in the figures on the reverse of their coins, as pointed out on p. 123. The coins of the last Indo-Greek king Hermaeus have on the reverse a sitting Jupiter; in those of Kadphises I, his place is

taken by a standing Hercules, and the same device re-occurs on those of Kadphises II, only exchanging the attributes of Hercules for those of Siva. The same name Kadphises occurs on the reverse of both; only the attributes vary, Kadphises II being called Great king, while Kadphises I is called merely a warrior-chief. Again on the obverse of Kadphises II, there is his own bust and superscription; while on that of Kadphises I, there is the bust of king Hermaeus with the latter's superscription, precisely the same, both as to figure and legend, as on the coins of Hermaeus himself. The coins of the so-called Kadphises I, clearly exhibit an intermediate or transition state, but do not necessarily point to a succession of three different rulers. It would rather appear, that under the weak king Hermaeus, the chief of one of the warlike Scythian tribes usurped the regal power, though not at first the regal title. Accordingly the obverse of the coins of the time was allowed to continue to bear the bust and legend of the nominal king, while on the reverse the usurper put his own name and device, the latter being a Greek one in imitation of the Greek device which it had supplanted. Later when Hermaeus was removed (perhaps by death), Kadphises assumed the regal titles also, and henceforth substituted his own bust and legend for those of Hermaeus. At the same time to further suit the changed state of things, the subordinate titles on the reverse were changed to the regal ones, and the Greek attributes of the figure on the reverse were also changed to native Indian ones, perhaps to conciliate his new subjects or to suit his own religious opinions. (2). The device of a standing Hercules used by Kadphises on the reverse of his coins, occurs on none of the coins of the Indo-Grecian kings; it is found only on the coins of three Bactro-Greek kings Euthydemus, Demetrius, and Lysias. The Bactrian Greek kingdom was founded by the two Theodotus, father and son, who had adopted as their device a standing Jupiter. The sovereignty was afterwards usurped by Euthydemus (about B. C., 215—185) who most probably had originally been ruler of Sogdiana (see Lassen I. A., Vol. II, pp. 284, 293) and who substituted his own device of Hercules (either standing or sitting). His son Demetrius (about 185—160 B. C.), who ruled not only Sogdiana and Bactriana, but extended his empire to the south and south-east as far as India proper, continued the same device of a standing Hercules. Towards the close of Demetrius' reign, however, his overgrown empire broke up. Thus Eukratides and Antimachus (about B. C. 165—145) wrested the southern parts of the empire from him, as shown by the fact, that the coins of these two kings are the first which have Arian-Páli legends. In Bactriana and Sogdiana itself Demetrius was succeeded by Lysias (about B. C. 160—140) who continues the old device of the standing Hercules and who re-conquered (about B. C. 145) some parts of his patrimony in the south from Helio-

cles, the son of Eukratides, as shown by his coins bearing an Arian-Páli legend. The device of Hercules, especially the standing one, may, therefore, be looked upon as peculiar to the Sogdian line of Bactro-Greek princes. Not long afterwards—there appears to have been an intermediate Queen Agathokleia, whose coin also shows the sitting Hercules—the Bactro-Greek kingdoms were subverted by Scythian tribes. The first to suffer that fate naturally was the northern kingdom of Sogdia and Bactria about B. D. 127. The southern kingdoms continued for a short time longer. The Sogdians themselves were Scythians, and they were joined by other tribes of the same race, living further to the east. Their leader would naturally assume the device of the standing Hercules of the old Sogdian house of Greek princes. This was done by Kadphises, under whom the Sogdian Scythians, advancing southwards, encroached on, and finally subverted the southern Greek kingdom under the last Greek king Hermaeus, about B. D. 90. (3). In the legend of his coins, as read by me, Kadphises describes himself as the sovereign of the Sogda people. This would agree with and confirm the facts as stated in No. 2. It may be noticed also that Arrian (in his *Anabasis* VI, 15, 4) mentions a people of Sogds as living on the Indus, though already at the time of Alexander's invasion.

Mr. H. F. BLANFORD exhibited an enlarged photograph of a portion of the solar disk, taken by M. Janssen at the Meudon observatory. Referring to the observation of Mr. Nasmyth more than twenty years ago, that the surface of the sun appeared to be composed of lenticular luminous masses which had been compared by some to willow-leaves and by others to rice-grains, he pointed out that the study of the solar surface by ocular inspection was attended with very great difficulties, owing to the intensity of the glare, which renders it almost impossible to determine the true forms of the luminous elements, notwithstanding such protection as may be afforded by the use of dark and coloured glasses. On the other hand in such photographs as have been taken for some years past at Kew and Greenwich, no structure is perceptible; and that this is the case arises from the phenomenon known as photographic irradiation. Any very brilliant object when represented in a photograph appears with blurred boundaries, the brilliantly illuminated surface extending beyond its true outlines over any darker objects around. Hence, the solar surface, which as M. Janssen's photographs show, consists of brilliant granules surrounded by others which are comparatively shaded, presents a blank area of uniform white. M. Janssen is the first who has succeeded in conquering this difficulty; and, for the last two years, has obtained photographs, on all clear days, which present the details of structure so sharply and distinctly, that they may be enlarged



not less than nine diameters (81 times in superficial extent) for the purpose of convenient study. The specimen exhibited is one of these enlarged photographs.

The original pictures having represented the sun's disk with a diameter of 30·5 centimetres, the enlarged photograph represented the central portion of a disk which, if complete, would be not less than 2·745 metres or about 9 feet in diameter.\* It showed in great perfection, the granular structure of the surface and that differentiation of parts which M. Janssen terms the '*réseau photosphérique*.' In certain areas, all the granules are more or less confused and drawn out as if swept along in a gaseous current; while, in the intervening tracts, they are distinct and rounded in form, presenting a series of brilliant dots surrounded by more shaded portions. M. Janssen is now engaged on the study of the movements thus brought to light, and this may be done with comparative ease with photographs, which afford an exact representation of the solar surface taken at intervals of 3 or 4 minutes or less.

The method which M. Janssen has devised with such signal success, depends on the fact that the prepared plate is not equally sensitive to all parts of the spectrum. In a series of experimental photographs of the solar spectrum which M. Janssen had taken in the speaker's presence, an exposure of one-third of a second gave only that portion immediately about the G line; as the exposure was prolonged, the image was extended further in both directions; and from two to three minutes gave the whole that could be obtained without the admixture of special pigments in the collodion. The first condition, then, requisite to obtain a sharp image of the granulations is to limit the exposure to the time requisite for the action of the G ray (and those rays immediately contiguous). This, in the case of the whole solar disk and in a favourable state of the atmosphere, is from  $\frac{1}{3000}$  to  $\frac{1}{3600}$  of a second. The second condition (seeing that no lens is completely achromatic, that is to say, that no lens has absolutely the same focus for all rays) is to adjust the sensitive surface of the plate to the focus of the G ray. And the third is to employ a collodion which presents a very perfect and even surface. The duration of the exposure is measured and adjusted by a very ingenious application of the tuning-fork. A sliding screen with a narrow slit is drawn by springs rapidly across the image formed in the focus of the objective. The width of the slit can be varied and adjusted by means of a micrometer screw. To determine the duration of exposure, a small slip of glass, previously smoked in a candle flame, is attached by a little wax to the slide, and a tuning-fork giving a known note (*i. e.*, giving a known number of vibrations per second,) with a bristle attached to one

\* On this scale the earth's disk would be about 1 inch in diameter.



of its prongs, is set vibrating transversely to the path of the slide. The slide being then released, a waved line is engraved on the smoked surface; and supposing that the fork vibrates 500 times in the second, the length of each wave represents the distance traversed in  $\frac{1}{500}$  of a second. If then the width of the slit be adjusted to one-sixth of a wave length, the duration of the exposure afforded will be  $\frac{1}{3000}$  of a second.

In conclusion, Mr. Blanford remarked on the wide field for the study of solar phenomena which is opened up by M. Janssen's discovery. The sun is still passing through a prolonged period of minimum activity, indicated by the absence of spots, faculæ and hydrogen flames. It is now in a state of comparative quiescence. Mr. Norman Lockyer has particularly remarked the reduced size of the corona, the absence of hydrogen flames and the predominance of the characteristic lines of magnesium\* in the chromosphere of the late eclipse. It will be especially interesting to observe the changes presented when the sun approaches another period of maximum activity, since faculæ always accompany sun-spots. It may be safely predicted that the brilliant faculæ and hydrogen flames (the same phenomenon seen from two different points of view) will increase at least to the same extent as the spots, and thus will probably be explained the apparent paradox which results from measurements (such as we have) of the solar radiation, *viz.*, that the sun is hottest when the spots are most numerous. It is a common popular idea, that the reverse is the case. Ignoring direct observation and reasoning *à priori*, it is inferred that the spots being cooler than the luminous disk, the sun must emit less heat when these are most numerous. It is with the character of the sun's surface as with that of men. The eye seizes quickly on the blots, but ignores and takes no note of the brilliant faculæ which accompany them, and out-shine the general surface.

CAPT. WATERHOUSE observed, with reference to Mr. Blanford's statement that the photographs of the sun previous to those done by M. Janssen were quite blank and showed no traces of structure beyond the spots, that when exhibiting one of M. Janssen's photographs at the Meeting in May last, he had mentioned that some of the small photographs taken with the photoheliograph by Colonel Tennant at Roorkee after the Transit of Venus showed very distinct traces of structure over the solar disc, and though of course they were wanting in the fine details of the granular structure, the outlines of what he believed M. Janssen called the polygons of his network were easily distinguishable. These photographs had been very carefully

\* Mr. Lockyer's view as is well known is that the greater intensity of the solar heat at the time of maximum sun-spots, causes a dissociation of the magnesium molecule, resolving it into hydrogen.

taken by Colonel Tennant and developed with pyrogallie acid. Some of the photographs taken in Calcutta with the same instrument on dry plates by Sapper Meins, who was sent out by the Secretary of State to take photographs of sun-spots, also showed the same structure. Owing to want of the proper appliances none of these photographs had been enlarged, and they were too small to give anything like such satisfactory results as those obtained by M. Janssen because the size of the disc was only 4 inches instead of 12 inches.

The following papers were read:—

1. *On a new Standard of Light.*—By L. SCHWENDLER, ESQ.  
(Abstract.)

The author illustrated his paper by exhibiting an actual standard. The new standard of light consists of a piece of pure sheet platinum of an U shape, cut accurately to fixed dimensions. When a sufficiently strong electric current is made to pass through the platinum, it becomes white-hot and emits a brilliant light. He showed experimentally how the intensity of this light could be varied, *i. e.*, the magnitude of the standard altered,—by varying the current, and that when the current was kept constant, the light was rigorously constant also.

Mr. Schwendler defines the new unit of light as:

*The quantity of light emitted from a piece of pure platinum weighing (x) grm. and having the most convenient shape and size, when a constant current of (y) webers per second passes through it.*

The advantages of the new standard are:

The Light is perfectly constant if the current is kept constant; it allows a correction to be made for the variation of the current when this variation is known; it can be reproduced very accurately anywhere; its magnitude can be altered to any extent to suit certain practical purposes by simply varying the elements of weight, shape and size of the platinum, or the strength of the current passing through it; it does not alter of itself, either in intensity, size, or position, and therefore most accurate photometric measurements can be made with it; the standard can be easily made to fit into any adopted system of absolute units. Hence the new standard fulfils *all* the recognised conditions of a perfect and rational standard, and Mr. Schwendler therefore proposes it should be adopted in future in England and India in lieu of the *Standard Candle*.

Mr. Schwendler concluded by saying that there would be no practical difficulties met with in the introduction of the new standard for technical purposes. Gas Companies and other Corporations that may in time be formed to supply that necessary commodity "light," to the general public would find it quite easy and highly satisfactory to themselves to

use such a reliable standard for measuring the light they sell, and the public on the other hand, would then know correctly the quantity of light they receive, and for what they have to pay.

The paper, written at the beginning of 1878, and originally intended to form an appendix to Mr. Schwendler's report "on the Electric Light experiments," will be printed in the Journal, Part II.

2. *Notes on the Old Burmese route over Patkoi viâ Nongyang.*—By  
S. E. PEAL, Esq.

(Abstract.)

In this paper the author shows the advantages to be gained by opening out a trade route between India, Burma and China over the Patkoi range, and recounts the various explorations that have been made with this object.

The paper will be published, with maps, in the Journal, Part II.

3. *On some experiments made at H. M.'s Mint in Calcutta on coining Silver into Rupees.*—By COL. J. F. TENNANT, R. E., C. I. E., F. R. S., &c., *Master of the Mint.*

(Abstract.)

This paper contains an account of some experiments made by the author to ascertain the cause and extent of the apparent refining that takes place when an alligation containing fine silver and copper is melted and of the further changes in the alloy during the processes of coining. The author also places on record some interesting information as to the general working of the Mint.

The paper will be published in the Journal, Part II.

4. *Observations on some Chandel Antiquities.*—By F. C. BLACK,  
C. E., and V. A. SMITH, B. A., C. S.

(Abstract.)

This paper is intended to be supplementary to the accounts of Mahoba and Khajuráho given in General Cunningham's Archæological Reports.

The present position of the Chandel clan is briefly noticed, and the rumoured existence of an unpublished inscription at Khajuráho is mentioned. The writers suggest that the 'magic square' cut on the right jamb of the door of the Jinanáth temple may not be ancient, and urge the necessity for careful editing of the known Chandel inscriptions. The discovery of two short inscriptions near Mahoba, and of a sixth life-size elephant statue in the Madan Súgar is announced.

Some remarks on the construction and decoration of the Khajuráho temples are offered, and stress is laid on the proofs of the extent to which restorations have been effected.

The questions as to the age and destination of the Ganthái temple are discussed at length, with the result that in the writer's belief this temple is not nearly so ancient as has been supposed by General Cunningham and Mr. Fergusson, but is on the contrary a comparatively modern unfinished restoration, composed possibly of ancient materials. This temple probably belonged to the Jains, and not to the Buddhists.

The concluding section of the paper is devoted to a description of three hitherto undescribed temples. These buildings are rectangular in plan and seem to have been Jain.

The writers hope in another paper to describe certain other remarkable buildings.

The paper will be published in the Journal, Part I.

5. *A Chandel Inscription dated 1240 S.*—By V. A. SMITH, B. A., C. S.  
(Abstract.)

The inscription from Mahoba of which I send a rubbing and hand-copy appears to me worth publishing, for although it is unfortunately very imperfect, it contains several names not mentioned in the Chandel inscriptions which have been published.

The record is engraved in very distinct Kutila characters on a large\* black slab, which was discovered by General Cunningham in 1843, built into the northern wall of the building known popularly as Rájá Parmal's fort.

In his account of Mahoba (Arch. Report, Vol. II), General Cunningham speaks of this inscription as one of Parmal's or Paramárdi's, but in a private letter to me he explains that he "did not mean to attribute it to "Paramárdi himself, but only to the period of his reign."

The inscription does not contain the name of the reigning Rájá, but there can be little doubt that the year 1240 S. was included in the reign of Parmál.

I cannot venture on a translation of what is left of this curious record, but perhaps some more learned member of the Society may be induced to take the trouble of making a translation so far as is possible.

No personal name appears in the first ten lines, which are occupied with the praises of some one whose name is lost.

The whole inscription consists of sixteen lines, at the eleventh of which the first complete verse is found. The record then goes on to state that "in the great family of Vátsavya was born Suhila son of Hallan." Reference is made to somebody named Jayapála, and the names of Nánika the founder of the Chandel dynasty, of Lakshmana, Kalála, and Mádhava occur. Devája the son of Somarája is mentioned near the end as a skilled workman, and the inscription appears to be intended to commemorate the erection of an edifice, probably a temple, with a "lofty steeple" (*s'ikhara*).

\* The inscription as it now stands measures 27" × 14'.

Nothing is known as to the original locality of this inscribed slab. Mr. F. C. Black has preserved it from further injury by fixing it carefully in the wall of the road bungalow near Mahoba.

This paper will be published in the Journal, Part I.

6. *Memo. on Seals etc., found at Sankesur, Fatehgarh District.*—By H. RIVETT-CARNAC, ESQ., C. S., C. I. E., F. S. A., M. R. A. S., &c.

(Abstract.)

This paper describes discs and seals of baked clay, which were found by Mr. Rivett-Carnac in large quantities in the ruins near Sankesur and Behar (see General Cunningham, Arch. Survey, Vol. I, p. 371), and of which he forwarded a few specimens. The discs are small, from 1 to 2 inches wide, and about  $\frac{1}{4}$  inch thick. They are mostly quite plain, a few are more or less ornamented; one of them bore a well defined Maltese cross; some of them are pierced in the centre. There were also some discs of marble, crystal or other polished stone, and of various sizes (the smallest about  $\frac{1}{4}$  inch wide); only one of these (apparently of granite) showed the central hole. Mr. Carnac suggests that these discs were votive offerings at the Buddhist shrines of Sankesur; those of clay being the gifts of the poorer classes, the others those of the rich, and the perforated ones perhaps signifying that the prayer had been granted. The clay seals, also, are small, from 1 to  $1\frac{1}{2}$  inches wide. Most of them bear an inscription, generally in the Kutila characters, but one in Gupta; containing the Buddhist creed: *ye dharmmā hetuprabhavā hetum teshām tathāganto hyavadatteshām cha yonirodhaḥ evam vādī mahāśrāmaṇaḥ*. In a note, contributed by Dr. Mitra, he says that these seals are well known. They were first noticed by Mr. Thomas in his paper on the ruins of Sárnáth; then by General Cunningham in his "Bhilsa Topes." They have been also noticed by Dr. Mitra himself in his "Buddha Gaya," p. 119, ff. Two, however, of Mr. Rivett-Carnac's seals are new. One of them has the word नत्यक् "of every day" on it. The other has four letters, which, two being very doubtful, cannot be read; there are two deer on it which show that it is Buddhist.

### LIBRARY,

The following additions have been made to the Library since the Meeting held in March last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
*presented by the respective Societies or Editors.*

Berlin. Die Königlich Preussische Akademie der Wissenschaften zu Berlin,—Monatsbericht, November, 1878.

Bombay. The Indian Antiquary,—Vol. VIII, Part 90.

*Kirtane, N. J.*—Hammîra Mahâkavya of Nayachandra Suri. *Sewell, R.*—Two Eastern Chalukya copper-plate grants. *Pope, G. U.*—Notes on the Dravidian or South Indian Family of Languages.

Bordeaux. Société de Géographie Commerciale de Bordeaux,—Bulletin, Nos. 3, 4 and 5 of 1879.

No. 5. *Comte Meyners d' Estrey*,—Le golfe Persique et son commerce.

Calcutta. The Geological Survey of India,—Memoirs, *Palæontologia Indica*, Series IV, Vol. I, Pt. 3.

*Lydekker, R.*—Fossil *Reptilia* and *Bratrachia*.

———. ———. Records,—Vol. XI, Pt. 4, 1878, and Vol. XII, Pt. 1, 1879.

Vol. XI, Pt. 1. *Waagen, W.*—On the Geographical Distribution of fossil organisms in India. *Ormiston, G. E.*—Submerged Forest on Bombay Island.

Vol. XII, Pt. 1. Annual Report of the Geological Survey of India, and of the Geological Museum, Calcutta; for the year 1878. *Lydekker, R.*—Geology of Kashmir.—Further notices of Siwalik Mammalia.—Notes on some Siwalik Birds. *McMahon, Col. C. A.*—Notes of a tour through Hangrang and Spiti. *Mallet, F. R.*—Note on a recent mud eruption in Ramri Island (Arakan).—On Braunite, with Rhodonite, from near Nâgpur, Central Provinces. *Feistmantel, O.*—Palæontological notes from the Satpura Coal-basin. *Hughes, Theo. W. H.*—Statistics of Coal importations into India.

Calcutta. The Indian Forester,—Vol. IV, Nos. 1, 2 and 3.

No. 1. *Brandis, D.*—Sulpiz Kurz.

No. 2. Influence exercised by trees on the Climate and Productiveness of the Peninsula of India. *Cooke, M. C.*—Some Fungi on living Plants in the N. W. Himalaya.

No. 3. *Brandis, D.*—Memorandum on the Rate of Growth of Teak. *King, G.*—Sketch of the Flora of Rajputana.

———. The Mahâbhârata.

Dresden. Jahresbericht des Vereins für Erdkunde,—Nos. 13, 14 and 15.

Leipzig. Deutsche Morgenländische Gesellschaft,—Zeitschrift, Band XXXII, Heft 4.

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No. 6. *Chatin, M. A.*—Sur l'existence d'un appareil préhenseur ou complémentaire d'adhérence dans les plantes parasites.

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No. 35. *Salét, G.*—La décomposition des corps simples, d'après les récents travaux de M. N. Lockyer. *Thoulet, J.*—Le nickel, ses gisements, sa métallurgie et ses usages. *Fontpertuis, Ad. F. de.*—L'émigration Chinoise.

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Table I.—ARIAN - PALLI CHARACTERS.

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
I	u	2	7	Y	Y	7	Y	5	7	Y	Y	Y	2	7	7	7	7	7	Y	Y	2	7	7	Y	Z	Y	Y	Y	Y	Y	Y	Y	Y
II	u	2	7	Y	Y	7	Y	5	7	Y	Y	Y	2	7	7	7	7	7	Y	Y	2	7	7	Y	Z	Y	Y	Y	Y	Y	Y	Y	Y
ma	ma	ha	ra	ja	sa	ra	ja	dhi	ra	ja	sa	sa	gda	lo	ga	i	sva	ra	ma	hi	sva	ra	sa	hvi	ma	ka	sa	sa	tra	da	ra		

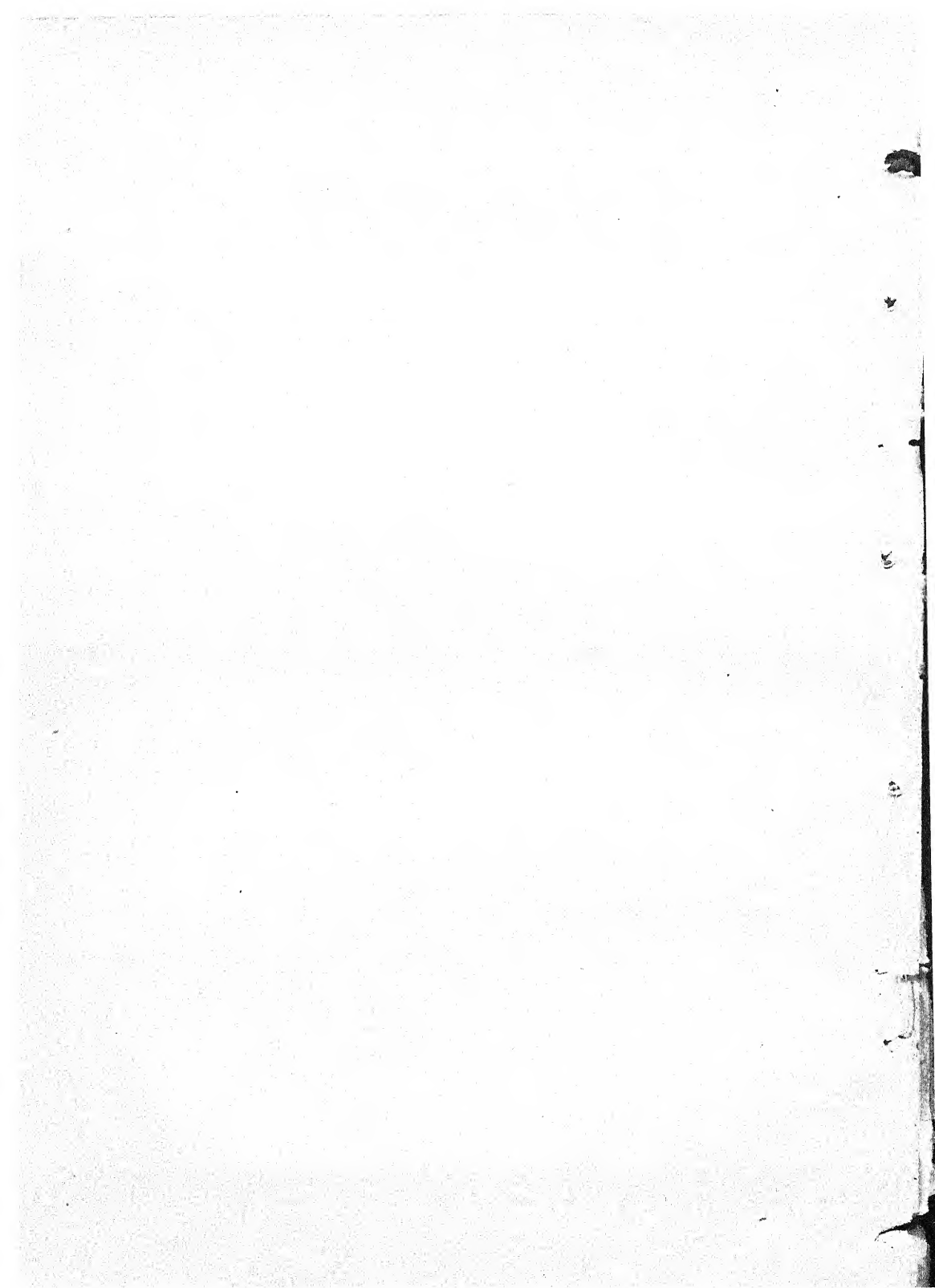
No. X has 4, 7, 10 Y, 13 2, 16 2, and omits 16.

Table II.—GREEK CHARACTERS.

Coins of	No.	A	B	Γ	Δ	E	H	Θ	I	K	Λ	M	N	O	P	Σ	Υ	Φ	Ω
KADPHISES	I-IX	1	6	10	11	14	17	26	28	31	36	38	47	47	56	56	62	64	64
	X	2	7	12	13	15	18	27	29	32	37	40	42	43	57	57	63	63	63
	XI-XIII	3	8	15	16	17	23	24	28	33	38	41	44	49	52	53	59	60	60
KANERKI	XIV	4	9	18	20	21	23	29	34	35	38	42	44	51	53	53	61	61	61
	XV-XVI	5	10	19	21	22	24	30	35	36	39	43	45	52	54	55	61	61	61
HVERKI	XVII	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table III.—MONOGRAMS.

No.	I to IX	X	XI	XII to XVI	XVII
Obverse	1	4	5	7	8
Reverse	2	6	9	10	11
Side of Coins	...	...	...	...	...
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	Right	Left	Right	Left	Right



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MAY, 1879,

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Tuesday, the 7th May, at 9 $\frac{1}{4}$  o'clock P. M.

W. T. BLANFORD, ESQ., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed :—

The following presentations were announced—

1. From the author. A History of the Brahma Samaj, by G. S. Leonard.
2. From the Royal Academy of Sciences, Munich. *Catalogus Codicum Latinorum Bibliothecæ Regiæ Monacensis*.
3. From the Director of Public Instruction. A Manual of Thibetan, by Major T. H. Lewin.
4. From the Superintendent Geological Survey of India. A Manual of the Geology of India, by H. B. Medlicott, and W. T. Blanford.
5. From the Smithsonian Institute. Scientific Results of the Exploration of Alaska, Article IV, Report on Limpets and Chitons, by W. H. Dall.
6. From the author. A catalogue of Mammals, Birds, Reptiles and Fishes of the Dominion of Canada, by A. M. Ross.
7. From the author. A Hindi Translation of the Raghuvansa, by Rāja Lachman Singh.
8. From the Government of Victoria. The Aborigines of Victoria, by R. Brough Smyth.
9. From the Curators of the Bodleian Library. *Catalogus Codicum Manuscriptorum Bibliothecæ Bodleianæ*, Pars. VI, *Codices Syriaci, Carshunici et Mendæi*, by R. Payne Smith, Pars. VII, *Codices Æthiopici*, by A. Dillman, and Pars. VIII, *Codices Sanscritici*, by Th. Aufrecht.



The following gentlemen, duly proposed and seconded at the last Meeting, were ballotted for and elected Ordinary Members—

J. M. Muir, Esq., C. S.      A. Smidt, Esq.  
J. Schroder, Esq.      C. J. Sheridan, Esq., C. E.

Mr. A. H. Anthony and Babu Uday Chand Dutt have intimated their desire to withdraw from the Society.

The COUNCIL reported that the following gentlemen had been nominated by the Council for election as Honorary Members of the Society.

Professor E. B. Cowell.      Dr. J. Janssen.  
Professor Regnaud.      Dr. A. Günther.

Prof. H. Milne-Edwards.

Professor EDWARD BAYLES COWELL, D. C. L., Edinburgh, is recommended in recognition of his services to the Society and to the cause of Sanskrit literature. He was elected a member of the Society on March 4th, 1857, and held the office of Philological Secretary from 1858 to 1864 when he retired from the country. When he joined the Society he had already established his reputation as an oriental scholar by his dissertation on Persian Poetry, published in the "Oxford Essays," and by an edition of the Prākṛit Grammar of Vararuchi with an English translation. During his stay in India he contributed several valuable papers to the Journal of the Society. He likewise edited for the Society a volume of the Taittiriya Sañhitā of the Black Yajur Veda, and published the texts along with English translations of the Maitri Upanishad of the Black Yajur Veda. The Kaushitaki Brāhmaṇa Upanishad of the Rīg Veda, and the Kusumāñjali, an abstruse treatise on the Hindu arguments for and against the existence of the Deity. Since his retirement his interest in the labours of the Society has remained unchanged, and he has contributed largely to the elucidation of many intricate questions connected with the history of Sanskrit literature. He has published a volume in continuation of the late Dr. H. H. Wilson's translation of the Rīg Veda Sañhitā, an epitome of the several philosophical dogmas of ancient India, being a translation of the Sarvadarśana Sangraha, and the text along with an English translation of the Aphorisms of Sāṅdilya on the Hindu doctrine of faith. As a Sanskrit scholar he ranks with the foremost orientalists of Europe.

Professor RENAUD is recommended in appreciation of the great services he has rendered to the cause of Semitic learning by his numerous dissertations on the literature of the Arabs, and by his researches into the Geography of Asia as known to the Arabs, and in recognition of the distinguished position he holds as an eminent Arabic scholar.

ALBERT GÜNTHER, M. D., PH. D., V. P. R. S., Keeper of the Department of Zoology in the British Museum, has chiefly devoted himself to the

study of Vertebrata. His Catalogues of Reptiles and especially of Fish are amongst the most important works published by the Trustees of the British Museum. He is especially entitled to recognition in India on account of his "Reptiles of British India," published by the Ray Society, a most valuable work, and the first complete monograph of any one class of Indian animals ever published.

HENRI MILNE-EDWARDS, Professor of Natural History in the Museum of Natural History, Paris, Foreign Member of the Royal Geological and Zoological Societies, has long been one of the first naturalists in Europe. He has written on many subdivisions of the animal kingdom, but his best known works refer to the Crustacea and the Corals; the modern arrangement of both of which has, in great measure, been founded upon his work.

M. JULES JANSSEN's original work as a physicist has been chiefly in connection with the Spectroscope. His earlier observations were directed to a determination of the selective absorption of the atmosphere for light and especially that of the vapour atmosphere. But his great discovery made in India, when engaged in observing the Solar eclipse of 1868, was the method of viewing the hydrogen flames of the Solar atmosphere at all times, by means of the spectroscope. This discovery was made independently and almost simultaneously, by Mr. J. Norman Lockyer. His latest discovery is perhaps even more important. By an ingenious limitation of the photogenic action of the sun, he has succeeded in photographing the solar surface with a degree of delicacy never before approached, and has thus opened out a new and most powerful method of studying the physical condition of the luminary.

The PRESIDENT said that the Council had also proposed to nominate Dr. Rájendralála Mitra as an Honorary Member, but Dr. Mitra had considered that by accepting the offer, he would not be in a position to do so much for the Society as at present, and had therefore begged to decline.

The COUNCIL reported that Mr. H. B. Medlicott had kindly undertaken the office of Treasurer during Mr. Beverley's absence on privilege leave.

The SECRETARY read a letter from Mr. H. RIVETT CARNAC, C. I. E., in continuation of his first memorandum on the subject of the preservation of antiquarian remains, and in which he describes the destruction of carvings and sculptures from the ruins of Kanauj he had lately witnessed while marching between Cawnpore and Fatehgarh, where he found that the *kheras* or mounds with which the country is dotted were being excavated

by a party of contractor's men in search of ballast for the new railway between Cawnpore and Fatehgarh.

Mr. Carnac again urges the Society to address the Government of India and beg that local Governments may be requested to call the attention of officers engaged on railways and other works to the importance of preventing the destruction of ancient remains for ballast and also to encourage zemindars to preserve and submit for inspection any old figures, inscriptions or other curiosities dug up on their estates.

The Secretary added that the Council had submitted Mr. Rivett-Carnac's memorandums to Government with a recommendation that some steps should be taken to carry out his suggestion.

The SECRETARY announced that the Committee of the Oldham Memorial Fund had transferred the sum of Rs. 65-4-9, balance of the fund, to the Asiatic Society's Servants' Pension Fund, and read the following report of the Committee.

*Report of the Oldham Memorial Committee.*

The Oldham Memorial Committee have the pleasure to report that the marble bust of the late Dr. Oldham, by Mr. Geflowski, was received from England in March, 1878, and is considered a good likeness.

The Committee have examined the accounts, as annexed, and find them correct.

As will be seen, there remains a balance of Rs. 65-4-9. The Committee do not think it necessary to consult the subscribers as to its disposal, as the sum is so small, but have added it to the Asiatic Society's Servants' Charitable Pension Fund in the same way as was done with the balance of the Stoliczka Memorial Fund.

The Committee have to warmly acknowledge the valuable services rendered by Dr. Dobson, in arranging for the execution of the bust, and its despatch to India.

J. WATERHOUSE, *Hony. Secretary.*

*Oldham Memorial Fund Account.*

RECEIPTS.

1876. By Subscriptions .....	Rs.	156	0	0
1877. Ditto, .....	„	1,068	0	0
1878. Ditto, .....	Rs.	132	0	0
By transfer of the amount paid by				
Dr. G. E. Dobson through Messrs.				
Trübner and Co., London, £ 3 3s.		31	8	0
		<hr/>	163	8 0
			<hr/>	1,387 8 0
	Rs.		1,387	8 0
			<hr/>	<hr/>

EXPENDITURE.			
Printing charges, .....	Rs.	11	0 0
Advertising ditto, .....		14	8 0
			25 8 0
Advertising charges, .....		9	4 0
Remitted to Dr. G. E. Dobson £50, .....		592	9 6
Ditto ditto, £52, .....		594	4 8
Repaid to the Asiatic Society, balance of cost of pedestal, .....		87	12 9
			1,283 14 6
Landing charges, &c., .....			12 12 9
			1,322 3 3
Balance in hand, .....		65	4 9
			Rs. 1,387 8 0

DR. HOERNLE read the following letter from Lt.-Colonel G. E. Fryer.

"In a note on page xiii, of the Preface to his 'Dictionary of the Pāli Language,' the late Professor Childers records the following:

"The authorship of the well known stanza asserting Pāli to be the 'original language is still unknown. Turnour (Mah. xxvii,) says it 'comes from the Payoga-siddhi, a grammar of the fourteenth century; but 'this is a mistake, for on examining a MS. of that work I find the stanza 'is merely referred to, the first pāda only being quoted. It may possibly 'be in Moggallāna Vyākaraṇa, a twelfth century work, but I am inclined 'to think it yet older. I venture to quote it here.

sā Māgadhi mūlabhāsā narā yāy' ādikappikā

brahmāno c' assutālāpā sambuddhā cāpi bhāsare;

'which means 'the Magadhese is the original language in which men of 'former ages and Brahma angels, and those who have never heard speech, 'and supreme Buddhas speak.'"

With reference to the foregoing I have to state that the stanza occurs in the Rūpasiddhi—a commentary on Kaccāyana's grammar—in the comment on the first sutta of the second—or Nāma—book, which is as follows:—

§ 1. jīnavacanayuttam hi.

adhikāro 'yam; tattha pañcamāre jītavā ti jīno; buddho; jīnassa vacanam jīnavacanam; tassa jīnavacanassa yuttam, jīnavacanayuttam, tepitakassa buddhavacanassa māgadhikāya sabhāvaniruttīyā yuttam anurūpaṃ evātidam adhiḥārattham veditabam.

sā māgadhamūlabhāsā narā yāy' ādikappikā

brahmāno c' assutālāpā sambuddhā cāpi bhāsare.

adhikāro pana tividho, sīhagatika-maṇḍukagatika-yathānupubbika-vasena ; ayam pana sīhagatiko pubbāparavilokanato, yathānupubbiko y-eva vā. Sakkaṭavisadisam katvā jinavacanānurū-

- §. 2. pavasena pakati ṭhapanattham paribhāsam āhalingaṇi ca nippaccate.

\* \* \* \* \*

"The author of the Rūpasiddhi was Dīpaṅkaro, otherwise called Bud-dhapiyo ; he was a disciple of Ananda, who was a disciple of the grammarian Moggallāna, otherwise called Saṅgharakkhita Thera. Moggallāna lived in Ceylon during the reign of Parākrama báhu I., 1153-1186 A. D. The Rūpasiddhi therefore could hardly have been written earlier than the thirteenth century A. D."

The following papers were read :—

1. *Rough Notes on the Distribution of the Afghan Tribes about Kandahar*.—By LIEUT. R. C. TEMPLE, 1st Goorkhas.

(Abstract.)

This is a very interesting paper on a subject on which every additional information must be welcome, especially at the present time. Another paper on the subject is promised by the author. The information contained in the present paper was collected by him, while he was employed in foraging in advance of General Stewart's Division during the march back from Kelát i Ghilzai to Kandahar and afterwards in taking a convoy of camels to Col. Patterson's reconnoitering expedition down the Arghisán Valley (1st to 23rd Feb.) The author found that nearly all the Afghans living in the Kandahar district are Duránis of the Popalzais and Bárákzai sections, divided into numerous septs. Of these a correct list is given supplementing the imperfections of the official one. He accounts for the frequent discrepancy in the names of the Afghan villages by the circumstance constantly met with by him, that they may be called by six different names which may be either (1), its own name, or may be (2), taken from the district or tract of land in which the village lies, or (3), from the section, or (4), subsection of the tribe which inhabits it, or (5), from the late owner, if recently dead, or (6), from the present owner.

This paper will be published in the Journal, Part I.

2. *Bulandshahar Antiquities*.—By F. S. GROWSE, Esq., C. S., M. A., C. I. E.

(Abstract.)

The town of Bulandshahar is so called after the high artificial hill on which stood the old Fort. Its original name was *Baran*, apparently an

abbreviation of *Ahibaran*, meaning, according to the author, "snake fort," and conjectured to have been originally a stronghold of the Nāga tribe. Of its early history, however, little trustworthy is known. Gold coins, bearing Greek and Pāli inscriptions, which not unfrequently used to be washed down in the rains from the high ground of the old city, show that the place at that remote period was one of considerable wealth and importance. At the time of Mahmud's invasion, in 1017, it was the seat of a Dor Raja, by name *Har Datt*. In 1194, Chandra Sen, the last of his descendants, was killed while defending the fort against the army of Sahab ud dīn Muhammad Ghori. Under the Muhammadan rule every memorial of their Hindu predecessors has gradually disappeared. After a search over every part of the district, the author was only able to discover a stone bearing two inscriptions, and a few fragments of pillars and doorjambs. The inscription contains a partly illegible date, which Dr. Rājendralāla Mitra in a note contributed on the subject, conjectures to be Samvat 1180 (A. D. 1124). Most of the pillars are ascribed by Mr. Growse to the time of the Dor Rajas, in the early part of the 11th century.

Mr. H. H. LOCKE made some remarks on the pillars, and said it would be of great interest to know how the author of the very interesting paper which had just been read had arrived at his conclusion as to the date of these pillars. There was no gainsaying the evidence of inscriptions—and it was more than probable that Mr. Growse had evidence as strong as an authentic inscription in support of the date which he assigned to the carvings—but Mr. Locke, judging from other examples, would have named a later date for these than Mr. Growse does, and therefore thought it would be very interesting and important to know how the latter gentleman had arrived at his conclusion.

The paper, with Dr. Mitra's note, will be published in the Journal, Part I.

3. *Note on some Mammals from Gilgit collected by Major Biddulph.*—  
By W. T. BLANFORD, ESQ., F. R. S.

This paper will be published in the Journal, Part II.

4. *Notes on a Donative Inscription from Rajaurgarh near Alwar.*—By  
RĀJENDRALĀLA MITRA, LL.D., C.I.E.

Bābu Harischandra of Benares has forwarded to me a facsimile of an inscription lately discovered in the neighbourhood of Alwar, together with a Nāgari transcript. The locale where the record was found and the circumstances connected with its discovery are thus described by the Bābu in his letter to me. He says, "In Rājgarh Parganah there is an inacces-



sible hill at a distance of forty miles south-west of Alwar. The hill abounds with tigers and wolves, which have been for a long time so little molested that they do not hesitate to attack men even in day-light. On the upper part of the hill some relics of an ancient city are still traceable, but it is now the site of a small village called Rajaurgarh. There are many wells in the land, which are not circular as those of the present day are, but generally of a square form, and water rests in them at the depth of eight or ten feet below the surface. Several large Buddh idols (which are unimportable) and many Siva lingas still exist there. There is 'a house still existing called the रुसी राणीका महल (*Rusi Rāṇikā Mahal*), or 'the Palace of an incensed Princess' (or Russian Princess?), but there tigers whelp now. Similarly remains of other old buildings are also traceable. A fortification made of stones runs over the hill for many miles. It has a gate known as Āśavārī gate, with shutters in comparative good order. The gate is named after the goddess Āśavārī whose temple stands in its vicinity. Just close to it stands the temple to which this *dāna-patra* belongs. There, by the order and at the expense of the Mahārājā of Alwar, five Brāhmans are engaged to offer their continual prayers. The Mahādeva in it is known by the name of Nīlakaṇṭha, because both the Linga and the Jaladhāri are made of blue stone. The temple is built in the old style, and the very first view of it shows its antiquity. A cowherd by chance got the inscription stone, and, thinking it to be a *bijak* of some money hidden under ground, because persons happened to get some old coins there, made it over to the Tahsildār of Rājgarh, which is a railway station twenty-four miles to the south from Alwar. The Tahsildār, imagining it to be a new thing, presented it to Thomas Cadell, Esq., V. C., the political agent at Alwar, who, with a view to get it read, sent it to Paṇḍit Rūpanārāyaṇa, a member of the Rāj Council. The Paṇḍit, seeing the characters written with *anusvaras* and *visargas*, took it to be a Sanskrita Inscription; but he could not make it out, and returned it back, saying it was written in Maithila characters, and none but a Maithil could read it.

"By chance my friends, Paṇḍits Bhavānand, Śrīdhara, Udayānand and Rāmachandra, four brothers, had been to visit the agent, who asked them whether they had seen the inscription stone? They replied that they had seen Paṇḍit Chanchal Jhā and Jagannāth Daftari sitting outside the bungalow, and trying to make out the inscription; but that they had not examined the inscription with a view to read it. The agent told them that as yet nobody had been able to read it, but he hoped that they would succeed. When they came outside, and saw the inscription stone, they found the mātrās similar to those of other Sanskrit writings; but the mode of writing was quite different to that of the present day. The inscription being writ-

ten in Sanskrit, they could read it out, and they explained the purport of it to the agent, who was very glad to hear it, and requested them to translate it into English, and, if possible, to take a print of it. Accordingly they took the inscription home, took a print of it, and translated it into English; both of which they gave over to the agent. The agent is at present at Udaypur. It is not known whether he has sent these to any press or not.

“The stone is at present with the above named Paṇḍits. It was found in the month of Magh, 1933 Samvat.”

The inscribed face of the stone measures 24 × 17 inches, and contains 17 lines of Sanskrit in the Kuṭila character. The record opens with the name of the paramount sovereign Vijayapāla Deva, son of Kshitipāla Deva, during whose reign, on Saturday the 13th of the waxing moon in the month of Māgha (January—February), in the Samvat year 1016 = A. D. 1071, it was executed to attest the gift of a village, named Vyāghravātika, with its adjoining fields to certain hermits for the worship of a lingam consecrated by the donor's mother Lachchhukā, and named after her Lachchhukeśvara. The donor calls himself Śrī Mathana Deva, son of the Mahārāja and Adhirāja Śrī Sāvata, of the Śrīhara clan of Gujjara.

The fact of the donor's giving away a village in the neighbourhood of Alwar, would imply that he was, in the fourth quarter of the 11th century, a ruler of that part of the country, and his capital was named Rājyapura, the modern Pargana of Rājgarh. He lived under the supremacy of the paramount sovereign Vijayapāla; but no information is vouchsafed regarding that sovereign. It is well known, however, that for three centuries or more, the Pāla kings of Gwalior exercised supremacy over a large tract of country, including a portion of the Doab and parts of Rajputānā, and it is probable that one of these was the sovereign referred to. In Père Tieffenthaler's “Description of India,” a long list is given of these Pāla Rājās, and the 67th of the list is named “Bedjepāl;” but he is said to have reigned at a much earlier date than 1078 A. D., and his father's name was “Tilek-pāl.”

At the close of the grant there is a supplementary sanad by which certain market tolls are assigned for the benefit of the temple aforesaid and of some others in its neighbourhood. The assignments include a toll of 2 Vis for every bag of goods, 2 Palas of oil or ghi for every jar or leather bottle of those articles, 2 Vis for every stall or shop, and 50 leaves for every Chollika coming to the market from outside the boundary of the village. The *pala* is a well-known liquid measure of a little over two ounces; but what the *vi* (वि) is, I cannot make out. It appears to me to be very like an abbreviation of *viśvā* or “twentieth;” but it cannot imply the twentieth of the merchandise brought for sale, for 2 *vis* would amount to ten per cent., a

large percentage to be assigned for the use of the temple, and quite out of keeping with the two and a half ounces of oil per jar. It could not, besides, apply to stalls and shops, for it would be absurd to suppose that a ten per cent. toll was levied on shops every month. At that rate the whole of the shop would disappear in 10 months. Some current coin is evidently meant, and if we take it to be the twentieth of a rupee or a five-pice piece, it would be near the mark. But I am not aware of any such coin having been current in the 11th century.

I am equally at fault about the meaning of the word *Chollika*. The word does not occur in any Sanskrit dictionary. The word *chulli* means "an oven," "a hearth," or "a funeral pile," but such things can form no part of a market, nor can there be any consistency in asking the owner of a hearth, or the leader of a funeral procession, to pay 50 leaves. I think the word implied an aboriginal or wild man of the woods, and every wild man who brought *shál* leaves for sale had to give 50 leaves for the use of the temples. Such leaves are brought by thousands to every market in the North Western Provinces in the present day, and used partly for packing small parcels, serving in this respect the purposes of brown paper of European grocers, and partly for eating from, the poorer classes not being able to afford metal plates, and earthen platters; which, according to Hindu custom, cannot be twice used for eating rice, are always expensive and cannot be kept clean for repeated use.

*Translation of a Sásana from Rajaurgarh near Alwar.*

Salutation to Śrīmán Rámánuja. Om! may it be auspicious. On Saturday, the 13th of the waxing moon in the month of Mágha, in the Samvat year one thousand and sixteen (in figures) S. 1016 Mágha, Sudi 13, Sani, in the prosperous and auspicious kingdom of his excellent majesty Mahárāja and Adhirāja, Lord Vijayapála Deva, the successor of his excellent majesty the Mahárāja and Adhirāja, Lord Kshitipála Deva. On this day the prosperous lord of Rájyapura Śrī Mathana Deva, son of the great king and king of kings, Śrī Sávata, of the Śríhara clan of Gujjara, to the officers of state, whether hereditary or temporal, and to the inhabitants, including wealthy merchants, jewellers and others, high and low, assembled in the village of Vyághravátaka, accords due greetings, information, and orders. "Be it known unto you, that knowing the body, wealth and life to be as unstable as drops of water at the points of grass-blades, and all worldly pleasures to be worthless; knowing also the immortality of good name and reputation; we have, for the augmentation of the virtue of our parents and of ourselves, and for our weal in this world as well as in the next, as also with a view to cross the worldly ocean, and to remove all

barriers from our way to heaven ; for the daily ablution of the image of Mahádeva, named Lachchhukéśvara after our mother Śrī Lachhuká ; and in order to furnish him with sandal, flower, incense offering, lamp, drink and minium ; for the reparation of the image and for its supervision ; and to furnish it with holy thread, and for the salary of the porters and servants attached to the establishment ; on this auspicious day of the consecration of the divinity, after performing due ablution and touching water, granted, in due form in an engraved record, without any reservation, the aforesaid village of Vyághravātaka, along with all its environs, pastures, trees, and reservoirs of water, along with the right of exacting the usual shares of the produce and alms-share, as also the right of collecting the revenues, such as fines, the fixed rates, the property of those who die without heirs, along with the adjacent fields of Gujjara. Knowing this, from this day and as long as the sun and the moon will endure, let the unmolested charge of worshipping the divinity in the auspicious temple of Rájyapura remain with the purúṣas and their disciples of Śrímán Onkára Śiváchárya of great renown and popularity, a regular performer of Vedic rites, disciple of Śrírúpa Śiváchárya, the pupil of Śrī Kantháchárya, of the temple of Gopála Devi Tadágapali, and the pupil of Sopuriya family, descended from Śrímán Áinar-daka. And let this grant be upheld by all future sovereigns, whether born in our family or of other dynasties who may reign here. They should not at all act detrimentally to this ; on the contrary they should, in compliance with our behest, uphold this our pious act, for they too will thereby derive from it a share of virtue, for it has been said by Bhagaván Vyása, the digester of the Vedas, 'By Sagara and many other kings the world has been ruled ; to whomsoever the land belongs for the time being, to him belongs the merit of gifts of land. Áditya, Varuṇa, Váyu, Brahmá, Vishṇu, Hutásana and Mahádeva congratulate and regard with favour the donor of land. The donor of land lives in heaven for sixty thousand years, while the revoker of the same and the abettor thereof dwell for a like period in hell. Those virtuous people who aspire to fame, white and stainless as the moon, or long for the blandishments of celestial nymphs, never resume grants made by others, for they think the upholding of grants to be even more commendable than making such grants.' " This grant was made by the king himself ; it was put in writing by his son ; it was proclaimed by Suraprasáda, and engraved by Hari.

Moreover, for the divinity above mentioned, for the four guardian divinities (Kuliká)\* around him, and for Vináyaka established within the city,

\* Eight classes of Nágas are usually invoked as guardian divinities, and the Kulikas are one of them.

market tolls are to be assigned at the rate of 2 Vis,\* as customary in hāts, for every bag of goods; 2 Palas† for every jar or leather bottle (*Kūpaka*) of oil or ghi; 2 Vis per month for every stall or shop; and 50 leaves for every Chollika‡ coming from outside. This is the edict of Deva Mathana. Salutation to Rāmacandra.

*Transcript of an inscription from Rājaurgarh prepared by Paṇḍit Bhavānand and his brothers.*

श्रीमते रामानुजाय नमः ॥ ॐ स्वस्ति ॥

- १। परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीचितिपालदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वर-
- २। रश्रीविजयपालदेवपादानामभिप्रवर्द्धमानकल्याणविजयराज्ये संवत्सरशतेषु दशसु षोड-  
शोत्तरकेषु मा-  
na  
y 1
- ३। घमाससितपञ्चयोदश्यां शनियुक्तायामेवं सं १०१६ माघशुद्धि १३ शतावद्य श्रीराज्य-  
पुरावस्थितो महाराजाधिराज-
- ४। परमेश्वरश्रीमथनदेवो महाराजाधिराजश्रीसावटस्त्रुर्गुर्जरश्रीहारान्वयः कुशली । ख-  
भोगावाप्तवंशपातकभोगसम्बद्ध-
- ५। व्याघ्रवाटकग्रामे समुपगतान् सर्वानेव राजपुरुषान्नियोगस्थान् क्रमागमकान्नियुक्त-  
कान्नियुक्तकान्सन्निवासिमहत्तरमहत्तम-
- ६। वणिक्प्रवणिप्रमुखजनपदांश्च यथार्हं मानयति बोधयति समादिशति चालु व-  
संविदितं दणामलमजलविन्दुसंस्थाना-
- ७। स्थिराणि शरीरसम्यज्जीवितानीतीमां संसारासारतां कीर्त्तिमूर्त्तेश्च कल्पस्थायितां  
ज्ञात्वा मातापित्रोरात्मनश्च पुण्यशोभिष्ट-
- ८। इये ऐहिकामुष्मिकफलनिमित्तं संसारार्णवतरणार्थं स्वर्गमार्गगोलोद्घाटनहेतोः स्वमाह-  
श्रीलक्ष्मुकानाम्ना श्रीलक्ष्मुकेश्वरम-
- ९। द्वादेवाय प्रत्यहं दस्त्रपनसमालभनपुष्पधूपनैवेद्यदीपतैलसुधासिन्दूरलागनखण्डस्फुटित-  
समारचनप्रेक्षणकपविवका-
- १०। रोहणकर्मैकवाटिकापालादिव्ययार्थमुपरिस्त्रुचितव्याघ्रवाटकग्रामः खसीमादणयूति-  
गोचरपर्यन्तः सोद्भूतः सटक्षमा-

\* Ante, p. 159.

† Equal to 6 tolas in weight.

‡ Ante, p. 160.

- ११ । लाकुलः सज्जो भोगमयुतादायाभ्यामपि समस्तसस्यानां भागखलभिच्चाप्रस्यकस्तन्वक-  
मार्गणकदण्डशपराधदाननिधिनिधा-
- १२ । ना पुत्रिकधननष्टिभरटोचितानुचितनिबद्धानिबद्धसमस्तप्रत्यादायमृदितस्तथैतत्प्रत्या-  
सन्नश्रीगुर्जरवाहितसमस्तक्षेत्रसमेतस्याकिञ्चि-
- १३ । तत्प्रप्राप्तोऽयं पुण्येऽहनि स्नात्वा देवस्य प्रतिष्ठाकाले उदकपूर्वं परिकल्प्य शासनेन  
दत्तो मलैवमद्यदिनादारभ्य श्रीमदामर्दकविनिर्गतश्री-
- १४ । सोपरीयसन्तत्यां श्रीक्षेत्रशिवे श्रीगोपालीदेवी तडागपालीमठसम्बद्धश्रीराज्यपुरे श्री-  
नित्यप्रमुदितदेवमठे श्रीश्रीकण्ठाचार्यशिष्यश्रीरू-
- १५ । पश्चिवाचार्यस्त्रिष्यश्रीमदोङ्कारशिवाचार्यस्यासल्लितब्रह्मचर्यावाप्तमदामर्दकः परम-  
यशोराशेः शिष्यप्रतिशिष्यक्रमेण देवो-
- १६ । पयोगार्थं तन्निमयवच्छेदेनाचन्द्रार्कं यावत्कुर्वतः । कारयतो वास्मद्दंशजैरन्यतरैर्वा-  
भाविमिर्भूपालैः । कालकालेष्वपि परिपन्थना-
- १७ । न कार्य्या प्रत्युतास्मत्कृतप्रार्थनया तत्र सानाथं वोढव्यं । यतः समनैवेद्यं पुण्यफला-  
वान्निरनुमनया । उक्तञ्च भगवता प-
- १८ । रमयिष्या वेदयासेन । बद्धमिर्वसुधा भुक्ता राजभिस्सगरादिभिः । यस्य यस्य यदा  
भूमिस्तस्य तस्य तदा फलम् ॥ आदित्यो वर-
- १९ । णो वायुर्ब्रह्मा विष्णुर्ज्योतिः । भगवान् शूलपाणिश्च अभिनन्दन्ति भूमिदम् ॥ पट्टि-  
वर्षसहस्राणि स्वर्गे तिष्ठति भूमिदः । आच्छेत्ता चानुम-
- २० । न्ना च तान्येव नरकं वसेत् ॥ यैर्वाच्छितं शिशिरदीधितिशुभ्रकीर्तयेय्यस्यमरप्रणयिनी  
परिरम्भणस्य । ते साधवो न हि हरन्ति परेण द-
- २१ । तां दानाद्वदन्ति परिपालनमेव साधु ॥ शासनं कृतवान् देवो लिखितं तस्य  
खनुना । यत्नां स्मरप्रसादेन उत्कीर्णं हरिणा तत इति ॥
- २२ । तथासुषै देवाय पार्श्वं । देवकुलिकाचतुष्टया ४ । राजधान्यां प्रतिष्ठितविनायक-  
संहिताय । चण्डदाने गोणीं प्रतिचण्ड्यावहारिकविं १२ । घटककूपकं प्रति दृ-
- २३ । तस्य तैलस्य च पल्लिकद्वे २ । वीथीं प्रतिमासि १२ विं १२ । तथा वहिःप्रविष्टचोत्तिकां  
प्रति पर्णानां ५० । एतदेवस्य कृतमिति श्रीमथन ॥ \* ॥

The following communication has been received—

*Description of some new species of Hydroid Zoophytes from the Indian Coasts and Seas.—By DR. J. ARMSTRONG, Marine Survey Dept.*



## LIBRARY.

The following additions have been made to the Library since the Meeting held in April last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies or Editors.

Berlin. Die Königlich Preussische Akademie der Wissenschaften,—Monatsbericht, December, 1878.

Bombay. Royal Asiatic Society,—Journal, Vol. XIV, No. 36, 1878.

*Rehatsch, E.*—A Panja of Yellow Brass, in the Museum of the Bo. Br. R. A. Society. *Cunha, J. G. da.*—Contributions to the Study of Avestaic and Vedic Analogies. *Bhandarkar, R. G.*—A Revised Transcript and Translation of a Chalukya Copper-plate Grant first published in the Jour. Bo. Br. R. A. Society, Vol. II, Part 4; with Remarks on the Genealogy and Chronology of the Early Kings of the Chalukya Dynasty. *Rehatsch, E.*—Early Moslem Accounts of the Hindu Religion. *Mandlik, V. N.*—Notes on Inscriptions in Kachh. *Lisboa, J. C.*—Notes on some Plants undescribed in the "Bombay Flora" of Dr. Gibson and Mr. Dalzell. *Bhandarkar, R. G.*—Memorandum on some Antiquarian Remains found in a Mound, and in the Brahmapuri Hill, near Kolhapur. *Gibbs, J.*—Notes on the Zodiacal Rupees and Mohars of Jehanghir Shah.

— The Indian Antiquary,—Vol. VII, Part 91, and Vol. VIII, Part 92.

Part 92. *Rice, L.*—Two new Chalukya Grants. *Burnell, A. C.*—On some Early References to the Vedas by European writers. *Rivett-Carnac, H.*—Archæological notes on a march between Cawnpore and Nagapuli, during the camping season of 1879.

Bordeaux. La Société de Géographie Commerciale,—Bulletin, Nos. 6, 7 and 8.

*D'Estrey.*—Le Golfe Persique et son Commerce.

Calcutta. Agricultural and Horticultural Society of India,—Journal, Vol. VI, Part 1.

*Anderson, J.*—Report on the supposed Poisonous Properties of Jowar. *Gamble, J. S.*—Memorandum on the different Species of *Prosopis*.

— Geological Survey of India,—Records, Vol. XII, Part 1.

*Lydekker, R.*—Geology of Kashmir, (3rd Notice). Further notices of Siwalik Mammalia. Notes on some Siwalik Birds. *McMahon, C. A.*—Notes of a Tour through Hangrang and Spiti. *Mallet, F. R.*—Notes on a Recent Mud Eruption in Ramri Island (Arakan). On Braunite, with Rhodonite, from near Nāgpur, Central Provinces. *Feistmantel, O.*—Palæontological Notes from the Sātpura Coal-basin.

— Mahābhārata,—No. 33.



London. Anthropological Institute,—Journal, Vol. VIII, No. 2, November 1878.

———. Athenæum,—Nos. 2681—2685.

———. Geological Society,—Quarterly Journal, Vol. XXXV, No. 137, Vol. XXVII, No. 105, and Vol. XIX, Nos. 73, 74, 75, and 76.

———. Nature,—Vol. XIX, Nos. 489—493.

———. Royal Astronomical Society,—Monthly Notices, Vol. XXXIX, No. 3, January 1879.

*Ranyard, A. C.*—Note on the Presence of Particles of Meteoric Dust in the Atmosphere. *Leander, F. W.*—On a Variable Diaphragm for use in Solar and Sidereal Observations.

———. Royal Society,—Proceedings, Vol. XXVIII, Nos. 190, 191 and 192.

No. 190. *Poynting, J. H.*—On a Method of using the Balance with great delicacy, and on its employment to determine the Mean Density of the Earth. Address of the President.

No. 191. *Thomson, W.*—On a Machine for the Solution of Simultaneous Linear Equations. *Thomson, J.*—On the Flow of Water in Uniform Régime in Rivers and other open Channels. *Gordon, J. E. H.*—On the Specific Inductive Capacities of certain Dielectrics.

No. 192. *Hartley, W. N.* and *Huntingdon, A. K.*—Researches on the Absorption of the Ultra-Violet Rays of the Spectrum by Organic Substances. *Frankland, E.*—On Dry Fog. *Stewart, B.* and *Dodgson, W.*—Note on the Inequalities of the Diurnal Range of the Declination Magnet as recorded at the Kew Observatory. *Pavy, F. W.*—Volumetric Estimation of Sugar by an Ammoniated Cupric Test giving Reduction without Precipitation.

———. Statistical Society,—Journal, Vol. XLI, Part 4; and List of Fellows, corrected up to December 1878.

*Jevons, W. S.*—On the Statistical Use of the Arithmometer.

New Haven. Connecticut Academy of Arts and Sciences,—Transactions, Vol. III, Part 2; and Vol. IV, Part 1.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1879,

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 4th June, at 9½ o'clock P. M.

Dr. S. B. PARTRIDGE, in the Chair.

The minutes of the last Meeting were read and confirmed:—

The following presentations were announced—

1. From F. S. Growse, Esq., 4 coins (see p. 173).

2. From the author, W. L. Distant, Esq., copies of the following

papers:

Notes on some *Hemiptera Homoptera*.

Description of new Species of *Hemiptera Homoptera*.

The Inhabitants of Car Nicobar.

Our present knowledge of the Nicobarians.

Eastern Coolie Labour.

On *Hemiptera* from the N. E. Frontier of India.

3. From the Home Department.—The Life of John Wilson, D. D.,

F. R. S. By George Smith.

4. From the Bengal Secretariat.—Papers relating to the Collection and Preservation of the Records of Ancient Sanskrit Literature in India.

By A. E. Gough.

5. From the Batavian Society of Arts and Sciences.—

Catalogus der Bibliotheek van het Bataviaasch Genootschap.

Verslag der viering van het Honderd-jarig Bestaan van het Bataviaasch Genootschap.

Kawi Oorkonden, Inleiding en transcriptie, by A. B. Stuart.

Gedenk Boek, by J. H. der Kinderen.

Wiwaha Djarwa en Brata Joeda Kawi. R. Th. Friederich.

A Medal commemorative of the 1st Centenary of the Society.

6. From the author.—Note on Elephants, and the transporting of them by Railway. By Captain H. W. Clarke, R. E.

7. From H. K. S. Arnold, Esq.—History of the Rise and Progress of the Bengal Army, Vol. 1. By Captain A. Broome.

The following gentlemen nominated by the Council at the last Meeting were balloted for and elected Honorary Members.—

Professors E. B. Cowell, J. Renaud and H. Milne-Edwards and Drs. J. Janssen and A. Günther.

The following is a candidate for ballot at the next meeting—

M. Finucane, Esq., c. s., Settlement Officer to the Court of Wards Raj Darbhanga, Madhubani, proposed by G. A. Grierson, Esq., c. s., seconded by Dr. A. F. R. Hoernle.

The CHAIRMAN announced that the Council propose the following amendment to Rule 14e; that, instead of the words, "As to the time of returning books &c.," the words: "for the use and general management of the Library," should be substituted.

The object of the amendment would be seen from the following circular which had been issued to all resident members, and he invited discussion from the members present, reminding them that under the rules a statement of any objections would have to accompany the voting papers which would be sent to all members of the Society, and stated that the question would come up again for final settlement at the August Meeting.

"In accordance with Rule 64a the Council beg to announce that they will propose to the Society at the General Meeting in June the following amendment to rule 14e; that, instead of the words "as to the time of returning books &c.," the words: "for the use and general management of the Library," should be substituted. The first paragraph of the rule will then read thus:—

*"To take out books, plates, drawings and manuscripts from the Library, subject to such restrictive regulations in the case of rare and valuable books, manuscripts, &c., and to such Rules for the use and general management of the Library as may be prescribed by the Council under Rule 48, Clause (a)."*

"Instead of

*To take out books, plates, drawings, and manuscripts from the Library, subject to such restrictive regulations in the case of rare and valuable books, manuscripts, &c., and to such Rules as to the time of returning books, &c., as may be prescribed by the Council under Rule 48, Clause (a)."*

"The Council propose this amendment because a Member of the Society has raised the question whether the Council have the power, under rule 48a, to enforce the Library byelaw that Members shall not be allowed to take out new books and periodicals

until the expiration of a month after their receipt; such byelaw being, in the opinion of the Member in question, an infringement of the privileges of Membership under Rule 14e.

"It is obvious that, although the Rule 14e does not actually define the power of the Council to prescribe restrictive regulations as to the *issue* of ordinary books and periodicals, the spirit of the Rule, in conjunction with Rule 48a, is, that the Council are to frame such regulations as seem to them desirable for the proper management of the Library, in the interests of the Society.

"The Council have under consideration the desirability of reducing the time that weekly periodicals shall remain on the Library table, to a fortnight. They would, however, remind Members that the Society's Library is essentially a Library of reference. The Society have not the means, nor is it an object, to make it fulfil the functions of a Circulating Library or Book Club. The Council are desirous of furthering the convenience of Members as far as possible in making use of the Library; but, in view of the great risk of loss that is run in letting out unbound numbers of serial periodicals and scientific Journals, and the difficulty of replacing many of them, if lost, the Council are of opinion that the facilities for taking such from the Library should be restricted as far as possible."

In reply to questions from some of the members present as to whether it was to be inferred from the last paragraph of the Notice that the Council proposed to restrict the privileges of members in taking books and periodicals from the Library, the Chairman explained that the Council had no such intention, that the object of the paragraph was to remind Members of the Society that their Library was distinctively one of reference, and that therefore it was of the highest importance to preserve their series of scientific journals as perfect as possible, and to appeal to Members to bear this in mind in making use of the Library, because the breaks in series caused by the losses that would probably be entailed upon the Library by attempting to use it as a Book Club greatly impaired the special value of the Library and were exceedingly difficult to make good.

After some discussion, the meeting unanimously approved of the proposed amendment.

The COUNCIL announced that Mr. J. C. Douglas had been appointed a member of the Finance Committee and Major H. S. Jarrett of the Philological Committee.

The SECRETARY reported that Mr. W. A. Bion had been confirmed in his appointment as Assistant Secretary.

Dr. HOERNLE exhibited and described four coins, kindly presented to the Society by F. S. Growse, Esq., Magistrate of Bulandshahar. They were

found in Bulandshahar on the site of its old Fort, some account of which has been given by Mr. Growse in his paper on the Bulandshahar Antiquities (see Proceedings, Bengal Asiatic Society for May 1879). Two of the coins are Indo-scythian copper coins; the other two are early Hindu gold coins. Of the former, one is a round specimen of the well-known coins of Kadphises, with the head of king Hermaeus on the obverse and a standing Hercules on the reverse (see Wilson's *Ar. Ant.*, V, 9; XI, 10). The inscription, on both sides, is too much worn to be decipherable. The other Indo-scythian coin is also a round one and belongs to Azes. It is an exact counterpart of the specimen figured in Wilson's *Ar. Ant.*, VII, 17. The obverse has the king on horseback, the reverse a standing Minerva, both turned to the right. Of the two gold coins, one is a specimen of the so-called "second series of Link-coins" of Prinsep. It is in fairly good preservation. On the obverse, there is the standing figure of the king, turned to the left, dressed in a suit bedecked with jewels and consisting of a tiara with the regal fillet, short coat with pendent sleeves, and trowsers. There is a nimbus round the head; the right hand points downwards to a small fire-altar; the left arm is raised, its hand resting on a spear or standard with pennons. Over the right hand and the fire-altar there is a trident with pennons. To the right of the fire-altar, and between it and the foot of the king, there is a small mark, looking like the letters *chi* in ancient Nágari. Between the feet of the king there is a row of dots or minute marks and above it some mark, which is almost entirely gone and now quite undistinguishable. Both these marks may be seen on the coin figured in Prinsep's *Ind. Ant.*, XXIX, 10 (ed. Thomas). In some of the coins of the preceding series (of Vasudeva?) in the cabinet of the Society the place of the *chi*-mark is occupied by the initial P of PAO, and that of the illegible mark by the final O of KOPANO. This circumstance may have been the origin of the marks on the present coin. Below the left arm, and between the body of the king and the staff of his spear, there are the letters *si*, quite distinct, in ancient (Gupta) Nágari; and below them some letter, looking like *ka*, but partly destroyed. On the other side of the staff, between it and the rim, there are, in large, very distinct Gupta characters, the letters *shaka* or *shake* arranged Chinese-fashion (𑖦 or 𑖧). Along the rim, there runs a circle of small, connected rings. On the reverse there is a draped female figure sitting on a high-backed, four-legged throne, looking to the front, holding a cornucopia in her left and the royal fillet in her right hand; her hair is dressed with jewels, and round the head there is a nimbus. On the right, between the frame of the throne and the rim, there are four very rudely cut letters, which seem to bear a faint resemblance to the Greek characters PAOX, which would be a remnant of the word APΔOXPO or

αρθρο, that is *ardhavira* or the half male, half female Śiva (Parvati). The letters are evidently meant as mere ornament, and badly imitated, without understanding, from the corresponding Greek legend on Indo-Scythian coins. The real legends of the coin are not Greek, but Indian. There is no monogram on either side. Neither in Prinsep nor in Wilson is there figured any coin exactly resembling this one. The copper coin, in Prinsep, XXXI, 4, is the nearest to it. Prinsep (Vol. I, p. 387) reads the legend on the obverse, *maka*.

The other gold coin is one of the so-called Gupta series and belongs to Chandragupta II. There is no specimen exactly like it, in either Prinsep or Wilson. Those nearest are Prinsep, XXX, 9, and Wilson, XVIII, 4. But on the present coin, on the obverse, the king is turned to the right, looking at his bow, while his right arm is raised, the hand holding some indistinct object; the inscription is *Deva śri mahārājādhirāja*; no monogram. The reverse is exactly like that on Prinsep, XXX, 9; viz., Lakshmi, sitting on a lotus; left hand pointing downwards, right hand holding the royal fillet; legend *śri vikrama*; monogram.

The following papers were read—

1. *Description of some new Species of Hydroid Zoophytes from the Indian Coasts and Seas.*—By DR. J. ARMSTRONG.

(Abstract.)

This paper contains descriptions of the following new species. *Lafoëa elongata*, found at Pigeon Island and Konkan Coast, also at Diamond Island off the coast of Pegu; *Halicornaria setosa*, found off Cape Negrals in 80 fathoms, Cheduba Island in 8 to 10 fathoms, off the Terrible Islands in 25 fathoms, and off Cape Comorin in 40 fathoms; *Halicornaria plumosa*, found off Cape Comorin in 35 to 40 fathoms, and off Cheduba Island in 10 to 15 fathoms; *Thimaria compressa*, found in abundance off Diamond Island and on the Konkan Coast, also off Cape Comorin; *Antennella allmanni*, found off Cape Comorin in 50 fathoms and off Cheduba Island in 8 to 10 fathoms; *Sertularella rigosa*, found off Cape Comorin in 40 fathoms and off the Arakan Coast in from 10 to 15 fathoms; *Desmoseyphus humilis*, found on coast of St. George's Island, West coast of India. *Endendrium ramosum*, found off Cape Comorin in 40 fathoms and very sparingly along the coast of Arakan in from 10 to 70 fathoms.

With the exception of a single species, all the above hydroid are calyptoblastic. The one exception is *Endendrium ramosum*, which is a typical gymnoblastic zoophyte, and is especially remarkable in having the gonophores borne not upon a true blastic style but upon atrophied hydrantha from which the tentacles have disappeared.

The paper will be published, with plates, in the Journal, Part II.

2. *Notes on the Formation of the Country passed through by the 2nd Column, Tal Chotiali Field Force, during the march from Kala Abdullah Khán in the Khojak Pass to Lugari Bár Khán, Spring of 1879.*—By LIEUT. R. C. TEMPLE.

(Abstract.)

The author commences his paper by describing a remarkable feature to be observed all over South Afghanistan, *viz.*, the peculiar gradual slope or glacis leading up to the foot of the hills which encompass the numerous valleys into which the valley is split up. This slope or glacis is generally very stony and covered with detritus from the hills, and is cut up by wide shallow stony river beds, down which the water rushes with enormous force after every heavy fall of rain. It seems likely, therefore, that the slopes have been formed by excessive denudation going on in the hills in consequence of their bare and treeless condition. But it is also possible that this denudation is helped by the action of frost in the case of hills formed, as many of the ranges are, of a slaty shale which is much disintegrated and split up near the hill tops. The cold at the summits of these hills, which are about 7500 to 8000 feet above sea level, is intense, and the frost separates the shale chips to be washed down by the next shower: the appearance of the hills seems to justify this hypothesis.

The author then goes on to make some remarks on the Metals, Salt deposits, Want of Trees, Fossil remains in the Shor Valley and about the Hanokai and Han Passes, and gives a series of notes on the country along the route followed.

The paper was illustrated with a large collection of upwards of 600 specimens of soils, rocks and fossils collected on the line of march, besides some specimens of pottery, and will be published, with a map, in the Journal, Part II.

Mr. H. B. MEDLICOTT remarks as follows upon Lieut. Temple's specimens:—

"With Dr. Feistmantel's assistance, I have gone through Mr. Temple's specimens, with the following result.

"The fossils are exclusively tertiary, none are post-tertiary. They are mostly nummulitic; possibly all of that age. The supposed lizard (No. 203.) is a detached segment of an echinoderm.

"The rocks are mere fragments, and the great majority of them only weathered pebbles. A very large proportion of them are of such limestone, sandstone and shale as are usual in the tertiary formation.

"There is no fragment of granitic or metamorphic rock, unless 121, which is crystalline limestone, but this may be only a contact rock. The

same may be said of the few specimens (Nos. 35, 44, 48 and 53) of indurated silicious rock, they are of the type common at the contact of eruptive rocks. Some of them are jaspideous. Of trappean rocks there are not a few (Nos. 57, 58, 89, 94, 95, 97, 100, 130, 141, 142, 143, 146, 161, 177, 180, 185, 186) some are syenitic or dioritic (non-quartziferous) and some are earthy amygaloidal.

"The crystalline minerals are the commonest forms of quartz, calespar and gypsum, one (No. 240) is clear white cubical rock salt.

"There is no metalliferous rock or mineral in the whole collection."

3. *A Balúchi Vocabulary with an Outline of Balúchi Grammar*.—By  
M. LONGWORTH DAMES, ESQ., B. C. S.

(Abstract.)

The language of Balúchistan is divided into two dialects, the Northern and the Southern. The latter which is also called the Makráni has been lately dealt with in Major Mockler's Grammar. The present work treats of the Northern dialect, which is spoken among the Rind Balúchis living in the neighbourhood of the Bolán Pass, in Kachí and on the Upper Sindh and South Panjáb frontiers. The difference between the two dialects is so great, that the one is almost unintelligible to the tribes speaking the other. Balúchi can hardly be called a written language. It is only within the last few years, that Balúchis have begun to write it, Persian being the ordinary medium of written communication, and the Balúchis considering their language to be merely a colloquial form of Persian. As regards vocabulary, it is a mixed language. The original old Persian stock has formed the nucleus round which the alien elements, principally Sindhi and South Panjábí, have gathered. The present work is the first attempt to compile a full and systematical vocabulary of the Northern dialect; and hereby differs from the accounts of it by Leech in the Journal B. A. S., for 1840, Bruce in his *Manual* (Lahore 1869) and Gladstone in his *Bilúchi Manual* (Lahore 1873).

4. *A Maithili Grammar or the Accidence of the Language of Mithilá (North Bihar); with a brief Chrestomathy compiled from various sources*.  
—By G. A. GRIERSON, ESQ., C. S.

(Abstract.)

Maithili takes its name from Mithilá, the ancient capital of the modern province of Tirhut or North Bihár, bounded on the north and south by the Himalaya and the Ganges, and on the east and west by the Kosi and Gandak respectively. It is spoken by Hindus and Muhammedans alike; alto-



gether by upwards of 7 millions of people. It is extremely free from admixture of foreign words, being composed mainly of words of Sanskrit origin. It differs from both Hindi and Bengali, its neighbours on the west and east respectively, both in Vocabulary and Grammar, and is as much a distinct language from either as Maráthi or Oṛiya. It is emphatically, a spoken language, possessing no literary work, beyond a history of Kṛishṇa and the songs of Vidyápati Thákur. The materials for the Grammar were obtained by the author partly from lists of grammatical forms supplied by paṇḍits, village gurus, &c., partly they were collected by himself in his intercourse with the natives in cutcherry, &c. The Grammar is divided into 4 Parts, with an Introduction and two Appendices. Part I treats of the Alphabet, Part II, of Nouns, Adjectives and Pronouns, Part III, of the Verb, Part IV, of Indeclinables and Numerals. Appendix I gives a comparative table of Alphabets, and Appendix II, a brief Chrestomathy.

5. *Coins of Khusrau Sháh and Kharran Malik, the Ghaznavi Kings of Lahore.*—By C. J. ROGERS, Esq., *Principal, Normal College, C. V. E. S., Amritsar.*

(With Plate IV.)

The first Musalman king who took up his residence in India was Khusrau Sháh. The coins of this king are very rare indeed. No. 8 is one of his. It contains his name and titles "*Us Sultan ul A'zim Muizz-ud-Daulat Khusrau.*" The mark on the *jhúl* of the bull is found also on the coins of his son Khusrau Malik. No. 2 exemplifies this.

The coins of Khusrau Malik resolve themselves into four classes. Two are of the bull type. One of these bulls has another sign, peculiar to these coins, on the *jhúl* of the bull, with a cross for a *rump* mark. The other has the sign already mentioned which is probably some word in *tughra*. The rump mark is the same as that of the previous coin, while the coin of Khusrau Sháh has a *trident* or *lotus*.

A third class has on the obverse a dotted margin and on the reverse two stars, one above the other, below the inscription, as in No. 3.

The inscription on all these coins is the same "*Us Sultán ul A'zim Táj ud Daulat Khusrau Malik.*"

The fourth class is by far the most numerous. The obverse is in every case the same:—a dotted margin with inscription "*Us Sultán ul A'zim Suráj ud Daulat.*" The reverse is of four different kinds, though each contains the name "*Khusrau Malik*" in a circle. Above the name, in some kinds, is *an empty space* as in No. 4, in some a

*crenscnt* as in No. 5, in some few a *star* as in No. 6, and in some a *cloud* or *canopy* as in No. 7. Nos. 4, 6 and 7 are very rare. No. 5 is common.

No. 9 is a new type of the coins of Tuglaq Sháh I.

No. 10 shows that he went on coining as his predecessors had done. The name of the king is on the obverse, on the reverse "*hazrat Dehli.*" No. 13 shows that Bahlol Lodí did the same. Both these types are very rare and are not in Thomas.

No. 11 was published\* by Mr. Delmerick in this Journal as "*a new type*" His specimen had no mintage on it. The present one shows that it was struck "*fi mulk i Talang*" in the year 724 A. H. I have seen several specimens of this coin. They are all deeply, but roughly cut. This is the only one I have seen with the place of mintage on it.

Nos. 14, 15, 16 are different types of the coins issued in the joint names of Fíroz Sháh and Muhammad Sháh,—the one name occupying one side "*Fíroz Sháh Sultáne,*" and the other side being occupied with "*Muhammad Sháh Sultáne.*" Thomas calls his coin "*unique.*" P. 307, No. 262.

No. 18 is a new type of a coin of the same kings. It is the same as some in Thomas, only about one half of the weight.

No. 17 is altogether a new type of coin of Fíroz Sháh. Obverse:—"*Fíroz Sultáne.*" Reverse:—" *Amir ul Mominín Abú ul Fath.*" This coin is in the cabinet of David Ross, Esq., Traffic Manager, Scinde Punjab and Delhi Railway.

No. 12 is an unpublished type of Bahlol Lodí:—Obverse, *Bahlol Sháh Sultán.* Reverse, *Shahr i Jaunpúr* 888.

The above new types of coins were all obtained in the Panjáb. Many of them are unpublished. I have not the slightest doubt that further search will give duplicates of many as yet unique coins.

\* J. A. S. B. Part I, Pl. IX, fig. 4.

## LIBRARY,

The following additions have been made to the Library since the Meeting held in May last.

## TRANSACTIONS, PERIODICALS AND JOURNALS.

*presented by the respective Societies or Editors.*

Batavia. Genootschap van Kunsten en Wetenschappen,—Notulen van de Algemeene en Bestuurs-Vergaderingen, Deel XII, No. 4; XIII, Nos. 1, 2, 3 and 4; XIV, No. 1; XV, Nos. 2, 3, and 4; XVI, Nos. 1, 2, 3 and 4.

———. Tijdschrift voor indische Taal-, Land- en Volkenkunde, Deel XXI, Nos. 5 and 6; XXII, Nos. 4, 5 and 6; XXIII, Nos. 1 to 4; XXIV, Nos. 4, 5 and 6; XXV, Nos. 1 and 2.

———. Verhandelingen,—Deel XXXVII, XXXVIII and XXXIX, Stuk 1.

Bombay. The Indian Antiquary,—Vol. VIII, Part 93, May 1879.

*McCrindle, J. W.*—The Periplus of the Erythraean Sea. *Fleet, J. F.*—A Particular Use of the word Samvat.

Bordeaux. La Société de Géographie Commerciale,—Bulletin, No. 9, May 1879.

*D'Estrey.*—Le golfe Persique et son Commerce.

Florence. Società Toscana di Scienze Naturali,—Atti, Marzo, 1879.

London. Athenæum,—Nos. 2686 to 2689.

———. Nature, Vol. XIX, Nos. 494 and 495, and Vol. XX, No. 496.

———. Society of Telegraph Engineers,—Journal, Vol. VII, No. 24, and Vol. VIII, No. 25.

No. 25. *Dubern, G.*—A New Form of Sounder.

Metz. Die Verein für Erdkunde,—Erster Jahresbericht, 1878.

Palermo. Società degli Spettroscopisti Italiani,—Memorie, Vol. VIII, Disp. 3, March 1879.

*Ricco, A.*—Combinazioni spettroscopiche a visione diretta. *Tacchini, P.*—Macchie Solari e facole osservate a Palermo nei mesi di Gennaio, Febbraio e Marzo 1879.

Roorkee. Professional Papers on Indian Engineering,—Vol. VIII, No. 3, April 1879.

*Cunningham, A.*—New Researches on the Expression of the Conditions of Motion of Water in Drains (Translation). *Dundas, J.*—Report on Experiments made at Lucknow on the Strength of Sal and Teak Timber, in 1877 and 1878.

St. Petersburg. La Société Impériale Russe de Géographie,—Séance mensuelle du 7 Mars 1879.

### BOOKS AND PAMPHLETS,

*presented by the Authors.*

- CLARKE, H. W. Note on Elephants. Calcutta, 1879, Pamphlet.  
 ———. Report on the Transporting of Elephants by Railway. Calcutta, 1879, Pamphlet.  
 DISTANT, W. L. Notes on some *Hemiptera Homoptera*. Pamphlet.  
 ———. Description of new Species of *Hemiptera Homoptera*. Pamphlet.  
 ———. The Inhabitants of Car Nicobar. Pamphlet.  
 ———. Our present knowledge of Nicobarians. Pamphlet.  
 ———. Eastern Coolie Labour. Pamphlet.  
 ———. On *Hemiptera* from the N. E. Frontier of India. Pamphlet.

### MISCELLANEOUS PRESENTATIONS.

A. BROOME. History of the Rise and Progress of the Bengal Army, Vol. I, Svo., Calcutta, 1850.

H. K. W. ARNOLD, Esq.

Tweede Vervolg—Catalogus der Bibliotheek, Svo., Batavia, 1877.

Verslag der Viering van het Honderd-jarig Bestaan, 4to., Batavia, 1878.

STUART, A. B. Kawi Oorkonden. Inleiding en transcriptie. With Plates. Svo., Leiden, 1875.

KINDEREN, T. H. DER. Gedenkboek van het Bataviaasch Genootschap, 1877-78. Deel I, 4to., Batavia, 1878.

FRIEDERICH, R. TH. A. Wiwaha Djarwa en Brata Joeda Kawi. Fep. Batavia, 1878.

BATAVIAASCH GENOOTSCHAP VAN KUNSTEN EN WETENSCHAPPEN.

GOUGH, A. E. Papers relating to the Collection and Preservation of the Records of Ancient Sanscrit Literature in India. Svo., Calcutta, 1878.  
 The Indian Forester, Vol. IV, No. 4, April 1879.

BENGAL SECRETARIAT.

Report on the Nagpur School of Medicine for 1878-79. Fep., Nagpur, 1879.

CHIEF COMMISSIONER, CENTRAL PROVINCES.

The Rajputana Gazetteer, Vol. I. Svo., Calcutta, 1879.

FOREIGN OFFICE.

SMITH, G. The Life of John Wilson, D. D., F. R. S. Svo., London, 1878.

FALLON, S. W. A new Hindustani-English Dictionary, Part XXI.

The Indian Antiquary, Vol. VIII, Part 93.

THE GOVERNMENT OF INDIA, HOME DEPARTMENT.

Catalogue of Sanskrit MSS. existing in Oudh, Fasc. XI. Svo., Calcutta, 1878.

List of Sanskrit MSS. discovered in Oudh, during the year 1877. Svo., Allahabad, 1878.

A Catalogue of Sanskrit MSS. in Private Libraries of the N. W. Provinces, Part III. Svo., Allahabad, 1878.

THE GOVERNMENT OF THE N. W. PROVINCES.

Account of the Operations of the Great Trigonometrical Survey of India, Vols. II, III and IV. 4to., Dehra Dun, 1879.

THE SURVEYOR GENERAL.

Proceedings of the Numismatic and Antiquarian Society of Philadelphia on the occasion of the Presentation of a Silver Medal to the President. Svo., Philadelphia, 1879, Pamphlet.

THE SOCIETY.

### PERIODICALS PURCHASED.

Bombay. The Vedārthayātna,—Vol. III, Nos. 1 to 4.

Calcutta. Stray Feathers,—Vol. VIII, No. 1, April 1879.

*Lydekker, R.*—Elementary Sketch of the Osteology of Birds. *Hume, A. O.*—A Rough Tentative List of the Birds of India. A First Tentative List of the Birds of the Western Half of the Malay Peninsula.

Göttingen. Gelehrte Anzeigen,—Stücken 12 to 15.

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*Slater, H. H.*—On a new Genus of *Pycnogon* and a Variety of *Pycnogonum Littorale* from Japan. *Sharpe, R. B.*—Description of two new Species of Birds from South-eastern New Guinea.

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*Lewis, G.*—Record of a Butterfly new to the Fauna of Japan.

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*Trimen, H.*—On *Spenceria*, a New Genus of *Rosaceæ*, from Western China. *Hance, H. F.*—On the Sources of the "China Matting" of commerce.

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*Perry and Ayrton.*—A New Theory of Terrestrial Magnetism.

London, The London, Edinburgh and Dublin Philosophical Magazine,—Vol. VII, No. 43, April 1879.

*Lodge, O. J.*—On the Determination of the Variation of the Thermal Conductivity of Metals with Temperature, by means of the Permanent Curve of Temperature along a Uniform Thin Rod heated at one end. *Hodges, N. D. C.*—On a New Absolute Galvanometer. *Ayrton, W. E.* and *Perry, J.*—A New Determination of the Ratio of the Electromagnetic to the Electrostatic Unit of Electric Quantity.

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*Lewis, T. R.*—The *Nematoid Hematozoa* of Man.

———. Society of Arts,—Journal, Vol. XXVII, Nos. 1377 to 1381.

No. 1378. *Stoffel, L. M.*—The Inoxidation of Iron, and the Coating of Metals and other Surfaces with Platinum, by the Processes of Mons. Dode.

New Haven. The American Journal of Science and Arts,—Vol. XVII, Nos. 98 and 99, February and March, 1879.

No. 98. *Barker, G. F.*—Results of the Spectroscopic Observation of the Solar Eclipse of July 29th, 1878. *Ihlseng, M. C.*—Mode of Measuring the Velocity of Sound in Wood.

Paris. Annales de Chimie et de Physique,—Tome XVI, April 1879.

*Berthelot.*—Sur la Transformation du sucre en alcool par voie purement chimique. *Deville, H. S.-C.* and *Mascart, E.*—Sur la construction de la règle géodésique internationale.

———. Comptes Rendus,—Tome LXXXVIII, Nos. 14 to 17.

No. 15. *Fonroque, D. de.*—Sur diverses expériences faites avec un pendule oscillant avec de grandes amplitudes.

No. 17. *Jamin, J.*—Sur la lumière électrique. *André, Ch.*—Sur un mode d'enregistrement continu de la direction du vent. *Cazeneuve, P.*—Sur le dosage du glucose dans le sang. *Le Président de la Commission du Passage de Vénus.*—Documents relatifs aux mesures des épreuves photographiques.

Paris. Revue Critique,—Vol. VII, Nos. 15 to 18.

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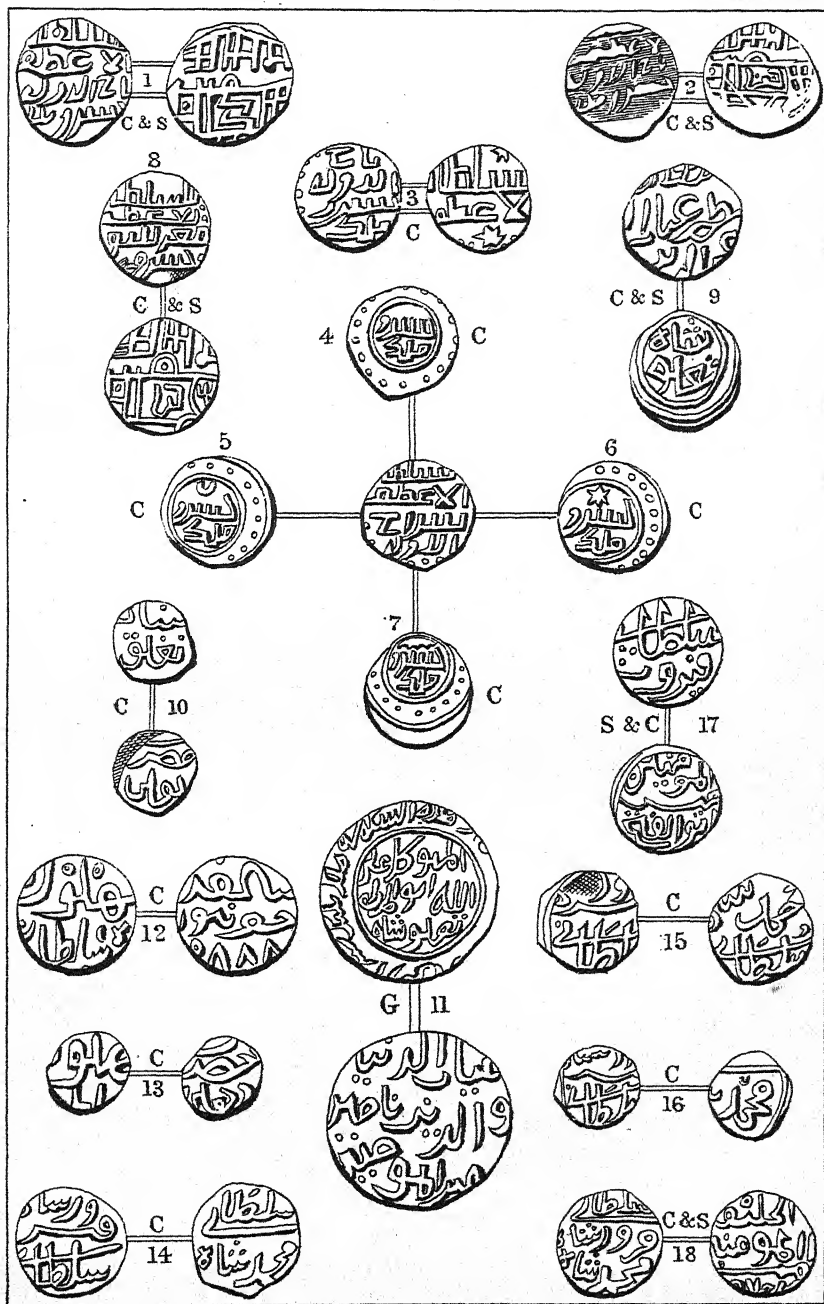
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No. 43. *Bréal, M.*—La science du langage.

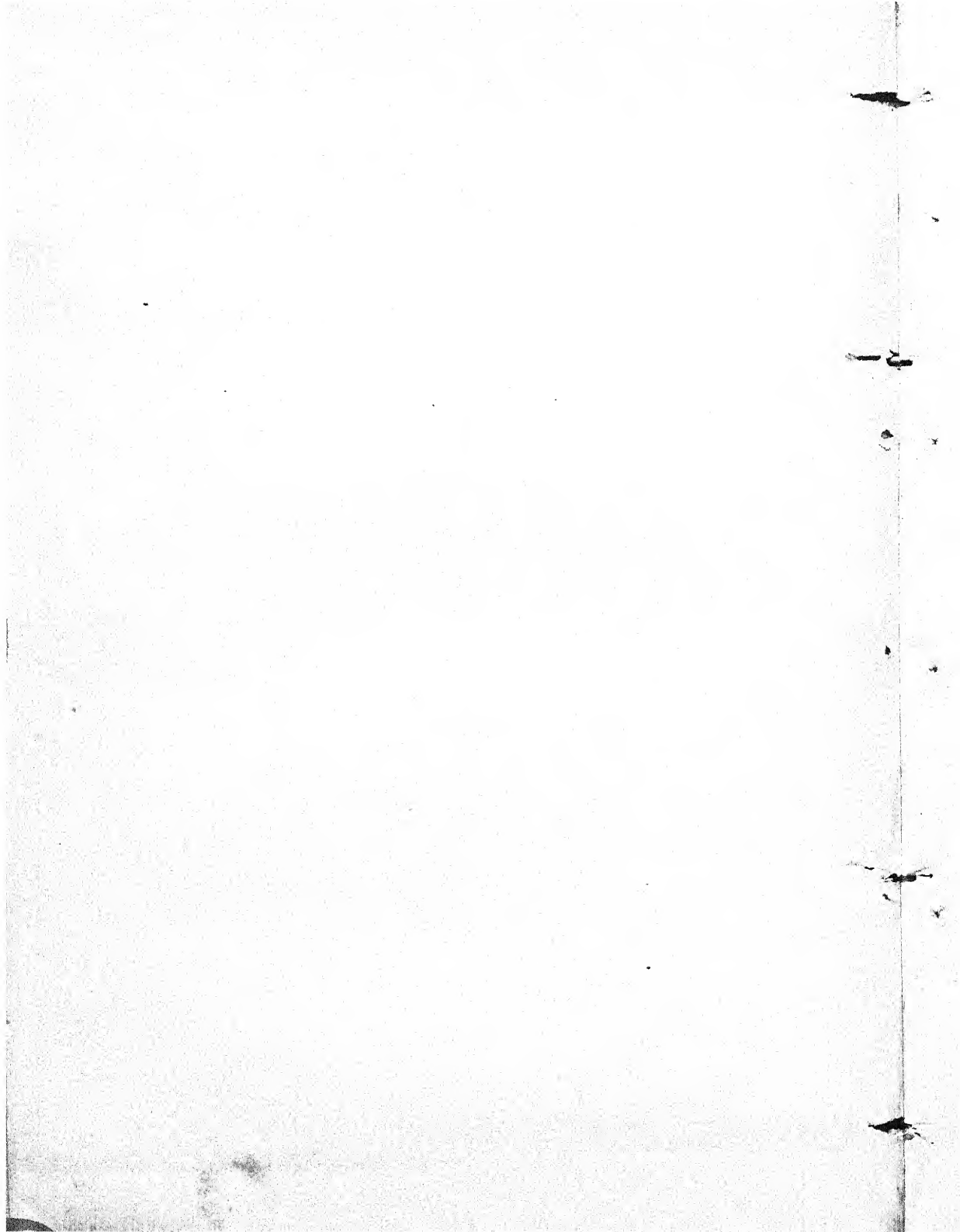
No. 44. *Rimbaud, A.*—La Russie Orientale et l'Asie Russe.







Zitrographed at the General's Office Calcutta.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY, 1879,

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 2nd July, at 9-15 P. M.

W. T. BLANFORD, Esq., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From V. Ball, Esq.—copies of his papers on Volcanoes of the Bay of Bengal, and On the forms and Geographical Distribution of Ancient Stone Implements in India.
2. From the Secretary of State for India—"The Voyages of Sir James Lancaster, to the East Indies and of Captain John Knight to seek the North West Passage;" and "The Hawkins' Voyage during the reigns of Henry VIII, Queen Elizabeth, and James I," published by the Hakluyt Society and edited by C. R. Markham.
3. From E. H. Man, Esq.—"The Commerce and Navigation of the Ancients in the Indian Ocean," by Dr. W. Vincent.
4. From the Department of Revenue, Agriculture and Commerce—"The Narratives of the Mission of George Bogle to Tibet, and of the Journey of Thomas Manning to Lhasa"; 2nd edition, by C. R. Markham.
5. From the Superintendent, Marine Surveys—A chart of Rajapur Bay and Viziadurg, West Coast of India.
6. From the Bengal Secretariat—"A Manual of Geology of India," by H. B. Medlicott and W. T. Blanford.
7. From Dr. Rājendralāla Mitra, Rai Bahadur, C. I. E.—Facsimiles of the Ananta Vasudeva Temple Inscriptions.
8. From Babu Surjya Narain Singh of Bhagulpur—Three silver coins, (1) of Bahadur Shah, (2) of Sher Shah, (3) of Islam Shah, son of Sher Shah.

The following gentleman, duly proposed and seconded at the last meeting, was ballotted for and elected an Ordinary Member—

M. Finucane, Esq., C. S.

The following is a candidate for ballot at the next meeting—

Herr W. Joest, Cologne, proposed by L. Schwendler, Esq., seconded by Major J. Waterhouse.

The SECRETARY reported that the following coins had been acquired under the Treasure Trove Act. From the Collector of Karnúl—one gold Pagoda, and one gold Moda, found in the old ruined village site of Pullagumme, District Karnúl.

The SECRETARY read an extract of a letter from Mr. Grote, dated 25th June, regarding the publication of the first part of Mr. Moore's papers on New Indian Lepidoptera from the collection of the late Mr. C. S. Atkinson, stating that it was hoped that the work would be read for publication in about a fortnight.

MAJOR WATERHOUSE exhibited a copy of a new—the 4th—edition of the Map of Turkestan, presented to the Society, by Major-General J. T. Walker, C. B., R. E., F. R. S., Surveyor General of India—under whose orders it has been compiled—and read the following note upon it.

*On the Fourth Edition of General Walker's Map of Turkestan, in four Sheets.*

In this edition the map has been extended by one degree in latitude, both to the north and south, beyond the limits embraced in the previous edition; extension was necessary to the south, in order to include the stations of Sukkur and Jacobabad, in Upper Sind, which formed the base of the recent military operations in Southern Afghanistan; and a corresponding extension was made to the north, to preserve the symmetry of the map.

Sheets 1, 2 and 3 have been entirely re-drawn. Sheet 4 embraces an area for which extensive geographical additions and rectifications may be expected in the course of a year or two; besides which it contains a large amount of intricate hill-shading of the Himalayas which could not well have been re-drawn by the available agency, soon enough to permit of the publication of the map at as early a date as was desirable; it has therefore been corrected up to date, and not re-drawn, and this circumstance will readily account for its being in some parts less highly finished than the other sheets, to any person who is familiar with the process of

photo-zincography, by which the map has been re-produced for speedy publication.

The new matter contained in the present as compared with the previous edition, and the various sources from which it has been derived, are as follow:—

Sheets 1 and 2 have not only been extended northwards from the 47th to the 48th parallel, but contain extensive additions, on the borders of the Caspian and Aral Seas, in Khiva and Bokhara and the Turkoman Desert and along the course of the River Oxus, and more particularly in Khokand and Hissar, the Alai Plateau, the Northern Pamir, and the independent States of Karategin and Darwaz. These have been mostly derived from the Russian Map of the Turkestan Military Circle, in 12 sheets—published first at Turkestan in 1877, and afterwards with corrections, as a chromo-lithograph, at St. Petersburg in 1878—and other Russian maps of which early copies were obligingly forwarded to General Walker by General Stubendorf, the Director of the Topographical Branch of the Russian War Office; something also has been obtained from Russian maps published in the '*Geographical Magazine*' and from the maps accompanying Mr. Schuyler's '*Turkestan*' and Captain Burnaby's '*Ride to Khiva*.'

It happens by a singular coincidence that, in the primary compilation of Sheet 2, the same error was made in accepting various details given in the Russian Map of the Upper Oxus Region (1878) which were afterwards proved to be erroneous, as was made in the compilation of the map *Das Quellgebiet des Oxus*, in Part I of Dr. Petermann's *Mittheilungen* for 1879. At the time when the drawing of this sheet was commenced, both the first edition of the Turkestan Map and the Map of the Upper Oxus Region were available; the latter, being on a larger scale and much superior in finish and execution, and also being the later of the two, was accepted as accurate, pending a reference to General Stubendorf on the subject. His reply to General Walker was almost identical with his reply to the editors of the *Mittheilungen* which is quoted at length in that Journal; happily it was received in time to permit of the erroneous matter being expunged and replaced by correct matter before the map was sent to press, which had not been practicable in the case of the German map.

In rendering the portions of Karategin and Darwaz which are most closely adjacent to the remarkable bend in the Panja branch of the River Oxus, the work of one of the Trans-Himalayan explorers—the Havildar—has been more closely followed than by the compilers of the Russian maps; for, though the Havildar was not a finished surveyor, he certainly

went over the ground near the river, taking bearings and pacing distances, whereas the Russian surveyors had not then extended their operations anything like so far to the south.

Of Sheet 3 the greater portion has been re-drawn on the basis of Major St. John's Map of Persia, with additions and corrections up to date, which were obligingly furnished by Major St. John. Major Wilson's Map of Afghanistan has been borrowed from to a large extent; and the conclusion at which he arrived, on an examination of certain documents which were lodged in the India Office—after the first Afghanistan War—that the longitude of Kandahar is probably some 10 to 15 miles to the east of the position hitherto assigned to it on most maps, has been accepted. Recent surveys have shown that Major Wilson is probably correct; and moreover it is known that the longitude hitherto adopted was a provisional value, chosen arbitrarily, with the intention that it should be rectified, after the reduction of Lieut. Durand's astronomical observations in 1843 for the determination of the longitude; but apparently through some oversight Lieutenant Durand's value was not employed, and the provisional value has been adopted up to the present time.

Colonel MacGregor's Reconnoissance across the Desert of Beluchistan; and Major Napier's Sketch of the northern Frontier of Khorassan, have been used in the compilation of Sheet 3. The recent operations of the Survey officers attached to General Stewart's Division of the Army in Afghanistan, have been available to some extent, for the purpose of adding to, and correcting the details of the routes between Khelat, Quetta and Kandahar; but the information derived from this source has as yet been very little, the greater portion of the maps not having reached the Surveyor General's Office.

Sheet 4 contains much new geography which has been obtained from other Survey officers with the armies in Afghanistan. An area of nearly 8,000 miles has been reconnoitered on the south-east frontier by Captains Heaviside and Holdich, while accompanying the column marching with General Biddulph from Kandahar to Dera Ghazi Khan, by the Tal-Chotiali route. A considerable area has also been surveyed in the valleys of Kurram, Khost, and Alikheyl, and generally in the country to the south of the Safed Koh Range, by Captain Woodthorpe, in connection with the movements of the column under General Roberts. And extensive additions to our knowledge of the country to the north of the Safed Koh Range, and for some distance beyond the Kabul River, have been made by Major Tanner, Captains Strahan and Leach, and Mr. G. Scott. Alterations in the delineation of the basins of the northern affluents of the Kabul River, which take their rise in the western portion of the Hindu

Kush Range, have been made on the authority of Major Wilson's Map of Afghanistan. In the region between the Kunar-Chitral River and the Indus considerable rectifications have been made, on the evidence of recent route Surveys by one of the Trans-Himalayan explorers—the Mullah—who has traced the Swat and the Punjkora rivers and several affluents of the Indus, to their sources in the Kohistan. The position of Tirich Mir, the highest peak yet discovered on the Hindu Kush Range, lying immediately to the north of Chitral, has been laid down from observations by Major Biddulph, who inclines, however, to the opinion that the mountain is some three or four thousand feet higher than the provisional value, 23,400, entered on the map as derived from his observations. The rendering of Kunjut and Shimshal, and the tract of country to the north of the Western arm of the Karakoram and Mustagh Range, has been greatly altered, so as to show more clearly what a large extent of *terra incognita* still remains to tempt any enterprising explorer—be he Russian or Englishman—to visit those regions. And far away to the east, between the valleys of Gangutri and Milam and along the border line between British India and Chinese Thibet, various not unimportant rectifications have been made on the basis of recent Surveys by Messrs. Ryall and Kinney.

Sheet 4 is now being re-drawn with a view to the publication of a new (the fifth) edition of the map, as soon as further data are available, which will probably be at no very distant date.

The present edition of the map has been wholly drawn, and also photo-zincographed, at the Head Quarters Office of the Trigonometrical Branch of the Survey Department in Dehra Dun, as were all the preceding editions.

The following papers were read:—

1. *Description of some Stone Carvings, collected in a tour through the Doab, from Cawnpore to Mainpuri.*—By H. RIVETT-CARNAC, C. S., C. I. E.

(With Plate V.)

The carvings and fragments of carvings submitted to the Society are a portion of those collected by me, during a tour through the Doab from Cawnpore to Mainpuri, through the well known tract, marked by the ruins of Kanouj, Sankesar, &c. The carvings are sent to demonstrate the importance of even fragments of ancient carvings being collected and preserved in the hope of obtaining therefrom some information regarding the habits, the circumstances and the state of civilisation of the people, by whom they were fashioned.

(I.) The red sandstone block is a fragment, and unfortunately a small fragment only, of what must have been a remarkably well-executed figure



of a woman. The proportions are good, and it will be noticed that the drapery has been most carefully and elaborately sculptured, the effect of the fineness and transparency of the texture of the cloth having been successfully rendered. The hand has been delicately chiselled and the whole work has been finished *ad unguem*. The jewelled belt round the waist must have been laboriously copied in every detail, with its beads and settings and chains and bosses, from some handsome original. This fragment would appear to belong to the period of Hindu luxury and power, immediately preceding the Muhammadan invasion. The fragment, even in its very imperfect state, conveys some idea of the beautiful clothes and the jewellery with which the women of that time were bedecked, and proves that the Hindu sculptor seven or eight hundred years ago was a proficient in his art. This fragment came out of a *khera* or mound at Kanouj from which bricks and stone were being collected and broken up for railway ballast. The figure had obviously been smashed by Muhammadan iconoclasts. Still what remains, I am confident, the Society will consider worthy of being preserved, fragment though it is.

(II.) The second piece (Plate V) is, I think, still more remarkable. This too is unfortunately only a fragment, the Muhammadan iconoclasts having effectually demolished the greater part of it. From what remains, however, it is to be gathered that the carving, when complete, represented a figure on horseback, accompanied by two attendants. The boldness of the group and the depth of the carving are, I think, remarkable; the figures stand well out in relief, and it will be noticed that even the portions of the dress &c. in the background are carefully finished. The saddle and accoutrements are elaborately rendered in every detail. There are, it will be seen, three saddle-cloths, the one arranged above the other, partly for ornamentation and partly to protect the horse's back. The knot securing the saddle has been tied and adjusted with professional precision. The body of the horse represents an animal, in rather too good condition, perhaps, according to our ideas, but with the rounded lines which even the native potentate of the present day is glad to secure for his steed of state. The action of the horse is spirited. The rendering of the two attendants is, I think, particularly meritorious. The proportions of the figures are excellent. They too are finished *ad unguem*. Unfortunately both of the heads have been smashed off. But enough remains of the leading figure to trace the turn of the head and the arrangement of the hair,

*"in comptum Lacaenae*

*More comas religata nodum"*.

The whole group seems to bear traces of Greek influence, and is certainly of a type quite different from the Hindu carvings of the present day.

The group was obtained by me from a little shrine near the village of Makranaggar close to a *khera* in which the sub-contractors had been digging for railway ballast, and this group, we were told, had been dug out of the *khera* during the operations.

(III.) The foliage and mango fruit of the fragment of what would appear to have been a portion of a large-sized carving, is rendered with more truthfulness and care than is generally met with on native sculptures of the present day.

It was found under a tree close to Gudanpur, where ballast operations under a native contractor had been in full swing for six weeks, in digging up and breaking up for ballast a *khera* which is supposed to represent the ruins of a palace of the Raja Bhoj, a favourite character in the traditions of this part of the country. Several miles of sandstone ballast have been supplied by this ruin alone. When I first visited the spot, about a month ago, large quantities of sandstone rubble were being dug out of the ruins; this was well adapted for ballast, and there was no sort of objection to the material being so utilised. But I saw carvings and the remains of carvings *in situ*. It is true that those I saw were of no value. But I found a coolie in the act of breaking up a small carved figure. It was hardly worth preserving, perhaps, but a coolie who smashed up an indifferently carved figure would hardly discriminate in the case of a valuable work of art. Unfortunately no attempt had been made, so far as I could ascertain, to make any plan of the ruin which was being demolished. I was told on the spot that an interior tank, surrounded by a number of small chambers had been come upon in the course of excavation. The whole place was in the process of being dug out, and there will soon not be a stone left. Some pieces of carving had been rescued by the villagers and placed under trees, or on platforms close by, and some of these were obtained by me and made over to the Collector for the proposed Museum. The piece of green stone, which I believe to be jade, was found here.

(IV.) The large head sent herewith was obtained at Behar, near Sankesar. From its proportions it must have belonged to a colossal figure. The type of face is hardly Hindu and approaches in character to the carvings found in the Punjab, which are held to bear distinct traces of Greek influence. Perhaps the figure to which the head belongs might be found, if Behar was systematically examined.

The mounds at Behar would, I am sure, repay excavation.

(V.) The little group of a man, woman and child standing under a tree, was obtained by me at Sankesar, where it was placed with other carvings and fragments of carvings near one of the chief shrines. The man's figure is particularly well sculptured. The woman, with her ornament &c., is

rendered somewhat in detail. The grouping, the proportions and the execution of these figures is, I think the Society will agree, very superior to the Hindu art of the present day. But for the presence of the child the group might be taken to represent Adam and Eve in the garden.

I believe that if fragments such as these now sent, were to be carefully collected in all Districts, some information might be obtained of the customs and the circumstances of former dynasties. The different styles of arranging the hair to which Dr. Rájendralála Mitra, C. I. E., first drew attention in his valuable work on Orissa, is in itself alone a study among the fragments I have seen in Fatehgarh.

2. *Note on an Inscription from the Gate of the Krishna Dvāraká Temple at Gáya.*—By DR. RÁJENDRALÁLA MITRA, RAI BAHÁDUR, C. I. E.

(Abstract.)

This inscription was first seen by Dr. Mitra in 1864. General Cunningham also noticed it in 1872 and published a facsimile of it in the *Archæological Survey Reports* (Vol. III, plate XXXVII.) It consists of 18 long lines in the Kutila characters; and measures 30 × 13 inches. It is in no way connected with Buddhism, nor with the temple to which it is now attached. It distinctly names Vishnu as the divinity for whom the temple which bore it was built. The dedicator of the temple is said to be Soma, a petty Zamindar, a descendant of one Viśvāditya. The latter is said to have encouraged the study of Sahadeva's treatise on the veterinary art. Sahadeva was a twin brother of Nakula, who is known to have written a work on the diseases of horses; and it is very likely that this work also passed in the name of his twin brother. The inscription bears date, the 15th year of Rája Naya Pála Deva. His reign began about the year 1040 (see Dr. Mitra's paper on the Pála Rájas in the *J. A. S. B.*, 1878). His fifteenth year, accordingly, would fall about the middle of the sixth decade of the 11th century.

This paper will be published in *Journal*, Part I.

3. *The Sect of the Prán-náthis.*—By F. S. GROWSE, Esq., B. C. S.,  
M. A. OXON., C. I. E.

(Abstract.)

The small and obscure sect of the Pránnáthis is one of the few of whose literature Prof. Wilson, in his *Essays on the Religions of the Hindus*, was unable to furnish a specimen. This want is now supplied by Mr. Growse's publication of the text and English translation of one of the poems of Pránnáth himself. It is entitled *Kiyámat-náma*, and is

the last and shortest of the fourteen treatises, ascribed to Pránnáth. It is very curious, both from the advanced liberalism of its theological ideas, and also from the uncouthness of the language, in which the construction of the sentences is purely Hindi, while the vocabulary is mainly supplied from Persian and Arabic sources. The writer, a Kshatriya by caste, lived at the beginning of the 18th century and was under the special patronage of Chhatrasal, the famous Rájá of Panna in Bandelkhand, who is commonly said by the Muhammadans to have been converted to Islám, though in reality he only went as far as Pránnáth, who endeavoured to make a compromise between the two religions.

This paper will be published in the Journal, Part I.

4. *The Copper Coins of the old Maharájdís of Kashmir*.—By CHAS. J. ROGERS, ESQ., *Principal, Normal College, C. V. E. S., Amritsar*.

(Abstract.)

This paper gives a description of 26 coins, some of which have not before been published. Most of them belong to 19, out of the list of 38 kings given in Prinsep's Tables, beginning with Avanti Verma, A. D. 875, down to Jaga Deva A. D. 1153. Two of the coins, here described, belong to kings hitherto unknown, Java Deva Deva and Bopya Deva. A third coin has not yet been identified. Nothing like a sign approaching to a date has as yet been traced on any coin.

This paper will be published, with two plates, in the Journal, Part I.

5. *Copper Coins of the Sultans of Kashmir*.—By CHAS. J. ROGERS, ESQ., *Principal, Normal College, C. V. E. S., Amritsar*.

(Abstract.)

This paper contains the description of 12 coins, among which are several that have not before been published. They belong to ten of the Sultans, mentioned in Prinsep's Tables; beginning with Sikandar Shah A. D. 1396, down to Júsaf Shah A. D. 1578. Most of them have dates, more or less distinctly legible.

This paper will be published, with one plate, in the Journal, Part I.

## LIBRARY,

The following additions have been made to the Library since the Meeting held in June last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies or Editors.

Berlin. Die Königlische Preussische Akademie der Wissenschaften,—  
Monatsbericht, January and February, 1879.

February. *Vogel*.—Ueber die photographische Aufnahme von Spectren der in  
Geissleröhren eingeschlossenen Gase. *Schrader*.—Ueber die Datirung  
einer babylonischen Thontafel aus dem elften Jahre des Cambyses.

Bombay. The Indian Antiquary,—Vol. VIII, Part 94, June 1879.

*Watson, Major J. W.*—The Fall of Pâtan Somanâth. *Walhouse, M. J.*—Archæo-  
logical Notes, Nos. 22 and 23. *Foulkes, Rev. T.*—Grant of the Pallava king  
Nandi Varmâ.

Bordeaux. La Société de Géographie Commerciale,—Bulletin, No. 10.

*D'Estrey*.—Le Golfe Persique et son Commerce.

Calcutta. The Geological Survey of India,—Memoirs, Palæontologia  
Indica, Series XIII. Salt Range Fossils.

*Waagen, W.*—Productus—Limestone Fossils. *Pisces Cephalopoda*.

———. Mahâbhârata,—Part 35.

———. Râmâyana,—Parts 8, 9 and 10.

Hamburg. Die Verein für naturwissenschaftliche Unterhaltung,—Verhand-  
lungen, Band III.

London. Athenæum,—Nos. 2690 to 2693.

———. Nature,—Vol. XX, Nos. 498 to 501.

Palermo. Società degli Spettroscopisti Italiani,—Memorie, Vol. VIII,  
Disp. 4, April 1879.

*Tacchini, P.*—Osservazione solari dirette e spettroscopiche fatte a Palermo nel  
1° trimestre del 1879.

Paris. Revue de Linguistique,—Vol. XII, Fasc. 1 and 2, January and  
February, 1879.

Fasc. 2. *Piétremont, C. A.*—Les Aryas et leur première patrie.

———. La Société de Géographie,—Bulletin, Vol. VII, Part 20.

Le chemin de fer de l'Asie Centrale. Nouvelle exploration projetée par S. A. I.  
le grand duc Nicolas Constantinovitch.

Rome. Reale Accademia dei Lincei,—Atti, Vol. III, Fasc. 5, April 1879.

*Herzen*.—Dell' influenza dell' acido borico sulla fermentazione acetica.

St. Petersburg. La Société Impériale Russe de Géographie,—Séance plénière mensuelle du 11 Avril, 1879.

Turin. Reale Accademia delle Scienze,—Atti, Vol. XIV, Disp. 3, February, 1879.

## BOOKS AND PAMPHLETS,

*presented by the Authors.*

BALL, V. Volcanoes of the Bay of Bengal. Pamphlet, 1879.

———. On the Forms and Geographical Distribution of Ancient Stone Implements in India. Pamphlet, 1879.

## MISCELLANEOUS PRESENTATIONS.

VINCENT, DR. W.—The Commerce and Navigation of the Ancients in the Indian Ocean; 2 vols. 4to., London, 1807.

E. H. MAN, Esq.

Publications of the Hakluyt Society :—

Vol. LVI. The Voyages of Sir James Lancaster, Kt., to the East Indies; and the Voyage of Captain John Knight to seek the North-West Passage. Edited by C. R. Markham. Svo., London, 1877.

Vol. LVII. The Hawkins' Voyages during the reigns of Henry VIII, Queen Elizabeth and James I. Edited by C. R. Markham. Svo., London, 1878.

### THE SECRETARY OF STATE FOR INDIA.

MEDLICOTT, H. B. and BLANFORD, W. T.—Manual of the Geology of India; 2 vols., with map. Royal Svo., Calcutta, 1879.

Annual Report on the Insane Asylums in Bengal. Fcp., Calcutta, 1879.

Annual Report on the Police Administration of the Town of Calcutta and its Suburbs for 1878. Fcp., Calcutta, 1879.

Administration Report of the Meteorological Reporter to the Government of Bengal for 1878-79. Fcp., Calcutta, 1879.

### BENGAL SECRETARIAT.

Report on the Working of the Government Charitable Dispensaries in the Central Provinces. Fcp., Nagpur, 1879.

Report on the Working of the Registration Department in the Central Provinces. Fcp., Nagpur, 1879.

Report on the Lunatic Asylums in the Central Provinces for 1878. Fcp., Nagpur, 1879.

### CHIEF COMMISSIONER, CENTRAL PROVINCES.

MARKHAM, C. R.—Narratives of the Mission of George Bogle to Tibet and of the Journey of Thomas Manning to Lhasa. Svo., London, 1879.

Geological Survey of India,—Records, Vol. XII, Part 2, 1879.



*Medlicott, H. B.*—Note on the Mohpáni Coal-field. *Mallet, F. R.*—On Pyrolusite with Psilomelane occurring at Gosalpur, Jabalpur District. *Wynne, A. B.*—A Geological Reconnaissance from the Indus at Kushalgarh to the Kurram at Thal on the Afghan Frontier. Further Notes on the Geology of the Upper Punjab.

DEPARTMENT OF REVENUE, AGRICULTURE & COMMERCE.

The Indian Antiquary,—Vol. VIII, No. 94, June 1879.

Fallon's Hindustani-English Dictionary,—Part XXII.

THE GOVERNMENT OF INDIA, HOME DEPARTMENT.

PERIODICALS PURCHASED.

Benares. A new Hindustani-English Dictionary,—Part XXII.

Bombay. The Vedārthayātna,—Vol. III, Nos. 5, 6 and 7.

Calcutta. The Indian Medical Gazette,—Vol. XIV, No. 6, June 1879.

Edinburgh. The Edinburgh Review,—Vol. CXLIX, No. 306, April 1879.

Giessen. Jahresbericht über die Fortschritte der Chemie für 1877,—Heft III.

Göttingen. Gelehrte Anzeigen,—Stücken 16 to 20.

Leipzig. Annalen der Physik und Chemie,—Band VII, Heft 1.

———. ———. Beiblätter,—Band III, Stück 5.

London. Academy,—Nos. 367—369.

———. Annals and Magazine of Natural History,—Vol. III, No. 17, May, 1879.

*Carter, H. J.*—Contributions to our knowledge of the *Spongida*. *Waterhouse, C. O.*—Description of new *Coleoptera* belonging to the Genera *Monomma*, *Silis*, and *Lithinus*.

———. Journal of Botany,—Vol. VIII, No. 197, May, 1879.

———. Chemical News,—Vol. XXXIX, Nos. 1016 to 1019.

No. 1019. *Lockyer, J. N.*—Note on the Spectrum of Sodium.—Report on the Experiments with the Electric Light on the Victoria Embankment.

———. The Entomologist,—Vol. XII, No. 192, May, 1879.

———. The Entomologist's Monthly Magazine,—Vol. XV, No. 180, May, 1879.

———. The Ibis,—Vol. III, No. 10, April, 1879.

*Meyer, Dr. A. B.*—Field-notes on the Birds of Celebes. *Nicholson, F.*—On a collection of Birds made by the late Mr. E. C. Buxton in Western Java.

———. London, Edinburgh and Dublin Philosophical Magazine,—Vol. VII, No. 44, May, 1879.

*Quinke, Dr. G.*—On the Formation of Emulsions, and the Action of the Bile in Digestion. *Siemens, C. W.*—On the Transmission and Distribution of Energy by the Electric current.



London. Messenger of Mathematics,—Vol. VIII, Nos. 95 and 96, March and April, 1879.

———. Nineteenth Century,—Vol. V, No. 27, May, 1879.

*Fawcett, H.*—The Proposed Loans to India.

———. Numismatic Chronicle, Vol. XIX, No. 73, Part I, 1879.

*Gardner, P.*—New Coins from Bactria. *Poole, S. L.*—Unpublished Arabic Coins, from the collection of the Rev. T. Calvert.

———. Quarterly Review, Vol. CXLVII, No. 294, April, 1879.

Agrarian Distress and Discomfort in India.

———. Journal of Science,—Vol. I, No. 65, May, 1879.

*Tracey, Major H. A.*—Ancient Glacier Action in the Punjab: with special Reference to Mr. Mattieu Williams's Theory.

———. Society of Arts,—Journal, Vol. XXVII, Nos. 1382 to 1385.

No. 1383. *Cooke, C. W.*—Edison's Electro-Chemical or Loud-Speaking Telephone.

No. 1384. *Perkin, W. H.*—The History of Alizarin and allied Colouring Matters, and their Production from Coal Tar.—A new Fodder-yielding Tree for India.

No. 1385. *Price, W. H.*—Kurrachee Harbour Works. *Wailly, A.*—Notes on Certain Silk-producing Bombyces.—Tusser Silk.

———. Westminster Review, Vol. LV, (N. S.), No. 2, April, 1879.

Paris. Annales de Chimie et de Physique,—May and June, 1879.

May. *Barthelot.*—Recherches sur l'ozone et sur l'effluve électrique.

June. *Pellet, H.*—Études nouvelles sur la composition générale des végétaux.

*Rosetti, F.*—Sur la température du Soleil; recherches expérimentales.

———. Comptes Rendus,—Tome LXXXVIII, Nos. 18 to 21; and Index to Tome LXXXVII.

No. 20. *Morat and Ortille.*—Recherches sur les altérations du sang dans l'urémie. *Renaut, J.*—Sur l'éosine hématoxylique et sur son emploi en histologie.

No. 21. *Fremy.*—Recherches chimiques sur la formation de la houille. *Tresca.*—Sur la distribution du travail à distance au moyen de l'électricité.

Paris. Revue Critique,—Vol. VII, Nos. 10 and 19 to 22.

———. Revue des deux Mondes,—Tome XXXIII, Liv. 2 and 3.

———. Revue Scientifique,—Tome XVI, Nos. 46 to 49.

No. 46. *Faye.*—Les lois des tempêtes. *Rimbaud, A.*—La Russie orientale et l'Asie russe.

No. 47. *Rialle, G. de.*—Les Aryas primitifs.

No. 48. *Jouan, H.*—Distribution géographique des oiseaux en Océanie.

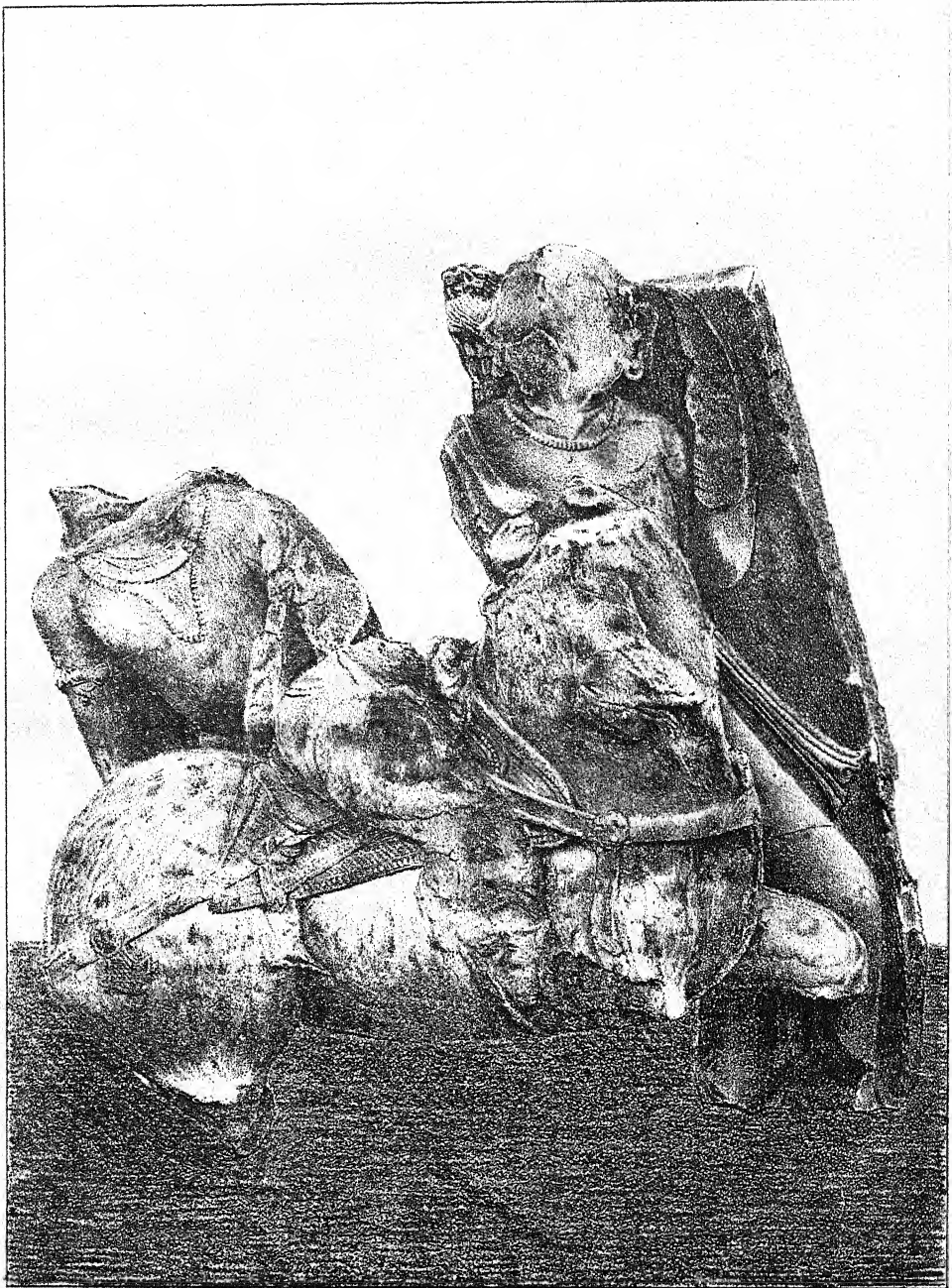
No. 49. *Joly, N.*—L'homme préhistorique Américain. (1) Les Chulpas du Pérou et de la Bolivie. (2) Les Mounds et les Munds-Builders.

———. Journal des Savants,—April, 1879.

New Haven. The American Journal of Science and Arts,—Vol. XVII, No. 100, April, 1879.

## BOOKS PURCHASED.

- Bibliotheca Orientalis pour 1877. Svo., Paris, 1878.  
 HOVELACQUE, A.—La Linguistique. Svo., Paris, 1878.  
 MEZ-O-KOVESD, CH. E. DE UJFALVY DE. Le Kohistan, le Ferghanah  
 et Kouldja; avec un Appendice sur la Kachgharie. Roy. Svo., Paris,  
 1878.  
 ———. Le Syr-Daria. Roy. Svo., Paris, 1879.  
 SCHEFFER, CH.—Iter Persicum, ou description du voyage en Perse, entre-  
 pris en 1602 par Etienne Kakasch de Zalonkemeny. Svo., Paris, 1877.  
 SCHERZER, F.—Recueil d'Itinéraires et des Voyages dans l'Asie Centrale  
 et l'extrême Orient. Roy. Svo., Paris, 1878.  
 Akbar-ul-Auliya. Svo., Kasur, 1877.  
 AMIN OF RAI.—Haft Iqlim. 4to.  
 AMIR KHUSRAU.—The Masnawi, entitled Hasht Bihisht. Svo.  
 BHASCARA ACHARIYA. The Lilavati, translated into Persian by the cele-  
 brated Feizi. Svo., Calcutta, 1827.  
 Diwan of Zamiri (Nizamuddin) of Bilgram. Svo.  
 Imarat ul Akbar. 4to.  
 The Shah 'Alamnámah of Ghulám 'Ali Khan. Svo.  
 SHIBABUDDIN TALASH. The Conquest of Assam by Mir Muhammad  
 Said. 4to.  
 Tarikh-i-Kasimi. Svo.  
 Tarikh-i-Qandahari. 4to.  
 Tarikh-i-Tahmasp. Svo.  
 Tazkirah-i-Nasrabadi. 4to.
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*S. Sedgwick Lith.*

*Calcutta.*

SCULPTURED GROUP FROM KANOUJ.

Scale—One-fourth full size



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 6th August, at 9.15 P. M.

W. T. BLANFORD, ESQ., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed :—

The following presentations were announced—

1. From St. Xavier's College Observatory,—Statement of Results from July to December, 1878.
2. From the Superintendent, Marine Survey,—(1) Chart of Preparis North Channel and entrance to Bassein Roads ; and (2) Chart of Verawal Roads, Kattywar, West Coast of India.
3. From Major-General J. T. Walker, R. E., C. B.,—two copies of the 4th edition of the Map of Turkestan.
4. From the Author,—the *Sanghita*, by Harasundar Tarkaratna.
5. From the Trustees of the British Museum,—(1) Index to the collection of Minerals, by Nevil Story-Maskelyne ; and (2) Catalogue of the Birds in the British Museum, Vol. IV,—*Passeriformes*, or Perching Birds, *Ciclomorphæ*, Part I, by R. B. Sharpe.
6. From the K. Institut voor de Taal-Land-en Volkenkunde von Nederl. Indie :
  - (1) *Abiasa een Javaansch Tooneelstuk*, by H. C. Humme.
  - (2) *Javaansche Vertellingen*, by Dr. W. P. van den Broek.
  - (3) *Babad Tanath Djawi*, in proza, by J. J. Meinsma.
7. From H. K. W. Arnold, Esq.,—a Brief Account of some of the principal Buildings of Madura, compiled by E. J. Sewell.
8. From the Registrar, Calcutta University,—Tagore Law Lectures, 1878. The Hindu Law of Marriage and Stridhan, by Gooroodass Banerjee.

9. From the Chief Commissioner of Mysore,—Mysore Inscriptions. Translated by Lewis Rice.

10. From the Department of Home Revenue and Agriculture,—(1) a Pahlavi, Gujarati and English Dictionary, by J. D. M. J. Asana. (2) Anatomical and Zoological Researches, comprising an account of the Zoological Results of the two Expeditions to Western Yunnan in 1868 and 1875, by Dr. J. Anderson.

11. From the Russian Geographical Society,—Adventures of the Priest Radivil Sirotki in the Holy Land, by P. A. Giltebrandt.

The following gentleman, duly proposed and seconded at the last meeting, was balloted for and elected an Ordinary Member—

Herr W. Joest.

The following are candidates for ballot at the next meeting—

1. D. G. Barkley, Esq., M. A., B. C. S., proposed by Carr-Stephen, Esq., seconded by Major J. Waterhouse.

2. R. Maconochie, Esq., C. S., Settlement Officer, Delhi, proposed by D. Ibbetson, Esq., C. S., seconded by J. Wilson, Esq.

3. Dr. C. F. Oldham, F. R. G. S., Surgeon-Major, 1st Goorkhas, Dharamsala, proposed by Lieut. R. C. Temple, seconded by Major J. Waterhouse.

4. W. D. Blyth, Esq., C. S., proposed by H. Beverley, Esq., seconded by W. T. Blanford, Esq.

The SECRETARY announced that Lieut.-Col. E. G. Clark had intimated his desire to withdraw from the Society.

The PRESIDENT announced that in accordance with the notice given at the June meeting, the votes would be taken on the proposed amendment to Rule 14 c.

Messrs. Westland and Wood-Mason were appointed Scrutineers and reported that the votes were 88 for, and 2 against the amendment.

The PRESIDENT announced that the amendment was carried.

The SECRETARY reported that the following coins had been acquired under the Treasure Trove Act—

From the Collector of Bijnor,—Two Silver Coins of Mahmud Sháh.

From the Magistrate of Budaun—Five Silver Coins of the "Hindu-Muhammadian" type.

The SECRETARY read a letter from Mr. H. Rivett-Carnac asking for information from members of the Society on the following ethnological queries put to him by Prof. Schaffhausen of Bonn.

I. Do any of the Indian tribes contract, elongate, or otherwise deform the heads of their children?

II. Have any elongated or small skulls (*Mikrocephalen*) been found in India as in the tumuli of the Crimea, Peru, Germany, France, &c.?

III. Are imbecile persons, or those with small heads (*Mikrocephalen*) regarded as holy in any part of India?

IV. Is any green stone, Nephrite, (*Fadeit brile*) met with in India, and for what purpose is it used?

V. Is the hammer (*Thorhammer*) or axe venerated any where in India?

VI. Have any representations been found on any of the old sculptures of fire being obtained by wood friction, and do any of the wild tribes in India employ this means in the present day.

The PHILOLOGICAL SECRETARY read a letter from Lieut.-Col. G. E. Fryer, Tavoy, forwarding copies of two small Buddhist Inscriptions.

"Having come across the enclosed among some of my old papers, I forward them to you in the hope that their publication may prove interesting to the members of the Society. They are copies of two inscriptions found in the Sandwé district, Arakan Division, British Burma.

"The first inscription (A, plate VII) consists of two pieces of stone brought to me by a cultivator who stated he found them while ploughing at the base of a low range of hills about three or four miles distant from the town of Sandwé. I visited the spot, but could discover no trace of any building in the neighbourhood. Pratapa Chandra Ghosha, formerly Assistant Secretary of the Society, thus deciphered the characters:

ye dharma hetu pra-  
-bhava hetum teshám tathá çubha  
teshám Tathágata hyava-  
-vat evam vádi Mahá Sramana.

"The second inscription (B, plate VII) is on a flat stone (nearly 7 inches long by 5½ broad and 1 inch thick), which was found in January 1872 in the cavity of a hill close to the village of Nga lun maw, in the Kwelu circle, Sandwé district. I visited the spot and found the cavity filled with sand.

"In a note to me, dated 22nd July, 1875, Dr. Rájendralála Mitra wrote, 'The reading of A is quite correct, but I am not prepared to say positive-



ly that its character is of the 8th century. It may be two or three centuries later, but certainly not older. The first three lines of B are exact counterparts of A, letter for letter, but the character is much older, probably of the 5th century. It is a corrupted form of the Gupta type. I cannot read the lower three lines just now.' "

Mr. W. T. BLANFORD exhibited a specimen of Hippuritic limestone collected by Dr. Oldham of the 1st Ghurka Regiment on the route from Kándahár to the Punjab by the Tal-Chotiali route. The specimen was obtained at a place called Siahgai, evidently the Mt. Siajgai of Lieut. Temple's map, about 70 miles E. N. E. of Quetta. The specimen exhibited shews casts of the interior of two *Hippurites* and portions of the shell of others.

The interest attaching to the discovery is considerable. *Hippurites* are characteristic of the cretaceous epoch, and especially of the period of the lower chalk (Turonian) and the Hippuritic limestone, so called on account of the prevalence of this very remarkable bivalve, is largely developed in Southern Europe and South-western Asia. This rock covers a large area in Persia and is found for some distance east of Karmán. A very small outcrop, probably referable to this formation, has been found in Sind and traces appear to occur in Tibet, north of the Himalayas. The discovery of the same rock in South-eastern Afghanistan serves somewhat to connect these isolated outliers. The rock from Siahgai is very similar to some of the Hippuritic limestone found in Persia.

The following papers were read :—

1. *The Ravages of Rats and Mice in the Dakhan during the Harvest of 1878-79.*—By the REV. S. B. FAIRBANK.

(Abstract.)

In this paper the author gives an account of the ravages committed by rats at the end of 1878 in the Parner, Shrigonde and Karzat táluqs and part of the Nagar táluq in the Ahmednaggar collectorate, and also in some táluqs in the Poona, Sholapur and Kaládgi collectorates and adjoining native states. These ravages were attributed by the people to the Jerboa rat (*Gerbillus Indicus* or *G. longipes*), called by the natives *pándhará undir* or the *white* rat. It was new to the author to hear of this rat being a serious nuisance, as such ravages have generally been committed by the *Metaḍ* rats, but there is no doubt that the *Gerbilles* have been the most numerous and so most destructive. They thrive just as well during the

rains as in the other parts of the year, and are not killed in their burrows by the rain as are the Metaḍ and Kok rats.

The black-winged Kite (*Elanus ceruleus*) feeds on the rats and is now, for the first time in the author's experience of 33 years, abundant in that part of the Dakhan.

The paper will be published in the Journal, Part II.

The SECRETARY read the following letter from Bábu Prannáth Pandit relative to the above paper :

"I am sorry that indisposition prevents me from attending to-night, but in connection with the Rev. Mr. Fairbank's paper, it might be of some interest to the meeting to know that the plague of rats was not unknown in Ancient India.

"*Kamandaki* in his *Nítisára*, a work composed anterior to the fourth century before the Christian era, has the following *s'loka* :

अतिदृष्टिरनादृष्टिर्मूषिकाः शलभाः शुकाः ।

प्रत्यासन्नाश्च राजानः षड्भेदे ईतयः स्मृताः ॥

"Excessive rain, drought, RATS, locusts, parrots, and neighbouring Kings (as invaders), these six are styled '*Itis*' (calamities)."

"I have not the work of *Kamandaki* just now at hand, and am therefore unable to give the exact reference, but the *s'loka* in question is quoted by *Mallinátha* in his commentary on *Raghuvamsa* I, 63."

2. *Exploration of the Great Sanpo River of Tibet during 1877, in connection with the operations of the Survey of India.*—By Major-Genl. J. T. WALKER, C. B., R. E., F. R. S.

(With map. Plate VIII.)

The course of this river has been explored by a new explorer N-m-g, for a distance of about 200 miles below the town of Chetang, the lowest point previously fixed. N-m-g was employed under the immediate instructions of Lieut. Harman, R. E., who has been writing out his journals and reducing and mapping his observations; but Lieut. Harman has had his time so fully engrossed by his regular duties in connection with surveys which he is carrying on in and around Darjeeling, that he has been unable as yet to send in the full report of the explorations. The following is therefore to be regarded merely as a provisional account of them.

N-m-g was deputed to Chetang, the position of which had been determined by Pandit Nain Sing in 1875. His instructions were to explore the course of the Sanpo river downwards for as great a distance as he possibly

could. Crossing to the north bank of the river he went along it eastwards for a distance of about 30 miles, nearly down to the point where it is joined from the north-east by a small river, called the Mikechu; here he had to leave the river, and make a considerable detour, up the Mikechu valley, and over the Lungla pass on the range which forms the eastern boundary of the Lhása basin, then down the valley in which the Chokorgye monastery is situated half way up and that of Thakpo at its lower end, near the town of Gyatsa-Jong on the Sanpo river; here he again struck the river which had been wending its way through the mountains for a distance of about 20 miles while he had been making a detour of over 50 miles. From Gyatsa-Jong onwards he kept to the river, until he reached Gyala Sindong, beyond which point he could not advance.

About 30 miles below Gyatsa-Jong he crossed over to the right branch of the river near Thakpo Nongjong; this place is situated near the junction of a river from the south which is said to pass by the town of Tsari, which Lieut. Harman believes is identical with D'Anville's Chaii.

Up to Gyatsa-Jong the course of the Sanpo river is fairly in accordance with the course shewn on Pandit Nain Sing's map of the country which he traversed between Lhasa and Assam, via Táwáng; Nain Sing had seen the course of the river for a distance of about 30 miles below Chetang, and he had been informed that from that point onward it flows in a southeasterly direction into Assam. We now find that it does flow in a southeasterly direction, but only for a short distance beyond Gyatsa-Jong, after which its course is due east for some 50 miles and then north-east for about 80 miles. The river reaches its most northern point near the intersection of the meridian of  $94^{\circ}$  with the parallel of  $30^{\circ}$ , about 12 miles to the north-east of a place which the explorer calls Chámkar, and which Lieut. Harman identifies with D'Anville's Tchamca.

After attaining its most northern point the river turns due south-east, reaching Gya-la-Sindong in 15 miles, beyond which place N-m-g was not able to follow it. There, however, he saw that it flowed on for a great distance, passing through a considerable opening in the mountain ranges to the west of a high peak called Jungla, of which the bearing was  $130^{\circ}$ . Beyond this opening the river was said to pass through a country inhabited by savages into a land ruled by the British Government.

Assuming the position of Gya-la-Sindong to have been fairly well determined by the explorer, its direct distance from the highest point hitherto fixed on the Dihang river, in the course of the survey operations in Assam, is only about 100 miles. The height of Gya-la-Sindong was found by the explorer to be 8000 feet, showing that the river had fallen about 3500 feet in 200 miles of distance from Chetang and leaving a de-

scent of 7000 feet for the distance of 160 miles down to the junction of the Dihang river with the Brahmaputra; this does not give an excessive slope compared with other Himalayan rivers.

One of the most interesting results of the present exploration is, that it affords an explanation of the probable source from which the Subansiri river draws its large volume of water. The fact of its volume being so large, coupled with the erroneous information derived from Nain Sing as to the supposed south-easterly course of the Sanpo below Chetang, had given rise to a conjecture that the Subansiri was the recipient of the Sanpo. That this conjecture is also erroneous has been shown by Lieut. Harman's recent operations for measuring the discharges of the principal affluents of the Brahmaputra river, which are briefly described at pages 16 and 17 of the *General Report of the Operations of the Survey of India* for 1877-78, and more fully in the *Journal of the Asiatic Society of Bengal*, Vol. XLVIII, Part II, No. 1, 1879. These operations indicate that the volume of the Dihang is from twice to three times as great as that of the Subansiri, so that of the two the Dihang has a far better claim to be the recipient stream. Still the difficulty remained of accounting for the large discharge of the Subansiri from so small a drainage area, and this difficulty is now removed, by the discovery of a large area below the great bend in the Sanpo around what may well be one of the two principal basins of the Subansiri and its affluents.

3. *Notes on Stone Implements.*—By J. COCKBURN, late Curator of the Allahabad Museum, Offg. Assistant Osteologist, Indian Museum, Calcutta.

(Abstract.)

In this paper the author describes some forms of celts and other stone implements found in the Khasi Hills, and in the Banda and Vellore districts.

The paper will be published in the Journal, Part II.

4. *Notes on the Gold Coins found in the Ahin Posh Tope.*—By MAJOR-GENERAL A. CUNNINGHAM, B. E., C. S. I.

(With plates IX, X, XI.)

When Dr. Hoernle wrote his notice of the gold coins found in the Ahin-posh Stūpa at Jalálábád, he was not aware that the inscription on the coins of *Wema Kadphises* had been discussed so long ago as 1863 by Professor Dowson and myself, quite independently of each other.\* Had he read our papers, he would have seen that several of his emendations of

\* For Professor Dowson's paper, see Royal Asiatic Society, Journal, XX, p. 239, and for my paper, see Bengal Asiatic Society, Journal, XXXII, p. 149.

Wilson's readings had been forestalled sixteen years ago, and that his proposed reading of *Sagdaloga-iswara*, or "sovereign of the Sogdians," is quite untenable. In our readings Mr. Dowson and myself agree in all the titles, and more especially in that of *Sarvalokiswara*; and I pointed out that the compound letter, which Dr. Hoernle now reads as *gd* was to be found in such words as *pūrva* and *achārya* as well as in *Sarva*; and that a similar compound, *rt* is found in the name of *Artamisiyasa*. My reading of the inscription on the coins of Wema Kadphises, was as follows:

*Mahārājasa rājatirājasa Sarvalokisurasa Mahisurasa Hima Kadphisasa  
tradata,*

and I especially noted that the two long titles were certainly intended for *Sarvalokeswara* and *Maheswara*. The only change that I would now make in this reading is in the name of the king, which I think may be read as *Kathphisa*, the cross over the lower limb of the *ph* being probably intended for the cerebral *th*.

Mr. Dowson has altogether omitted the letters immediately preceding the name of Kadphises. I have read them as *Hima* or *Vima*, and have identified this name long ago with the Greek OOHMO. But I have done more than this, I have also suggested that *Wema* is the true name, and that *Kathphisa* is only a title; and further that *Wema* may be identified with the great king *Wen*, from whom no less than ten royal families in Sogdiana and Bactriana claimed descent so late as A. D. 600. We know also that *Yen* and *Wen* are interchangeable pronunciations; from which I conclude that *Wemo Kadphises*, or *Wema Kathphisa*, is identical with the great Yuē-ti Prince *Yen-Kaoching*, to whom the Chinese refer the conquest of India.

The inscription on the Greek side of these coins is invariably the same: BACIAEYC OOHMO KAAΦICHC. Dr. Hoernle thinks that the objects placed immediately under the bust are letters, and he reads them as MITAC. But in this view he is certainly mistaken, as I have examined numbers of these coins, and have now lying before me two large double stater pieces, on which there is no trace of any letters. I have always taken these shapeless objects to represent clouds, above which is seen the bust of the king.

The figure on the reverse of these coins is certainly *Śiva* himself, and not the *arddhanariswara* figure, half male and half female. In all the androgyne figures of *Śiva* and *Pārvati* that I have seen there is a marked line of difference between the two halves of the figure in the dress. But on these coins we have *Śiva* alone, clad in a *dhoti*, and holding a trident in his right hand, and his water-pot in his left, with the panther's skin thrown over his left arm.

*Coins of Kanerki or Kanishka.*

There are six coins of the great Kanishka, with various reverses, of which only one is new. Of No. XIV, with the reverse of CAAHNH, I possess two specimens myself. The other coins with the reverses of Miïro, Athro, and Okro are common.

The new coin bears a figure of Buddha himself standing to the front, with his alms-bowl in his left hand, and his right hand raised in the act of teaching. It is inscribed simply BOΔΔO or Buddha. This coin is unique ; but the figure of Buddha has already been made known on his copper coins, of which I possess six specimens. Two of these represent him seated, and the others standing, exactly in the same position as on this gold coin.\* On these copper coins of Kanishka there is a longer inscription reading CAKA-MA\*\*BOΔΔ\* which I take to be intended for *Sākya Maha Buddha*. It will be remembered that two coins of this type were obtained by General Ventura in the Great Manikyala Tope. These passed to James Prinsep, from whom I obtained one by exchange.

The coins of Kanerki differ from those of Wema Kadphises in presenting us with Greek characters only ; but in two languages, Greek and Indo-Scythian. The former gives only BACIAEYC BACIAEON KANHP-KOY, of which the other is clearly a translation with the addition of a single word at the end=PAONANO PAO KANHPKI KOPANO. Here *Raonano-Rao* is the equivalent of "King of kings," and the last word must be a title of some kind. Dr. Hoernle thinks that "the word *Korano* has not yet been satisfactorily explained." He mentions that "Lassen takes it to be a Greek corruption of *Kushana*, expressing some title," while he himself inclines to identify it with the Greek *Koiranas* a "chief," and especially a "military chief."

It is evident from these remarks that Dr. Hoernle has not seen my identification of the Greek *Korano* with the Indo-Scythian *Kushán*, which was the name of the tribe to which Kanishka himself belonged. I pointed out to Lassen that as *Kanishka* and *Hucishka* became *Kanerki* and *Hoverki* in Greek, where *sh* is changed to *r*, so the *sh* of *Kushán* would be changed to *r* in Greek, and become KOPANO. But my arguments were drawn chiefly from the coins of Kozola Kadaphes or Kadphises who takes the title of *Zavu* (ZAOOY) of the *Kushán*. Now we learn from the Chinese that *Khieu-tseu-khi* (Kujula) the leader of the one tribe of Kuei-shang, absorbed the other tribes and called himself "King of the Kuei-shang."

\* For both seated and standing figures see my article in the Bengal Asiatic Society's Journal for 1845, p. 430, with its accompanying Plate. Three coins with the standing figure will be found in 'Ariana Antiqua,' Plate XIII, figures 1, 2, 3.



Now the title which all the descendants of *Wen* bore in the 7th century A. D. is given by the Chinese as *Shao-wu*, which I take to be the same as the *Zavu* of the coins. Thus on the coins of Kozola Kadphes we have the following inscriptions :

*Kushanasa Yüüäsa Kuyula Kaphasa.*

Which is simply transliterated in the Greek XOPANCY ZAOOY KOZOAA KAAΔAΦEC. In this rendering it is especially noticeable that where the native spelling of the name begins with *kh* the Greek does the same. But this would not have been the case had the word been intended for the Greek title KOIPANOY.

But this peculiar change of *sh* to *r* is not a *caprice* of the author of the Greek legends of the coins ; but is in strict accordance with a peculiar law of the Turki language by which *sh* and *z* are changed to *r*. We thus see how the *Zavu* (ZAOOY) of Kozola Kadaphes became *Rao* on the coins of *Kanerki* ; and how the titles of *Koranou zavu* and *Rao nano Rao Korano* represent in the most literal manner the title of "King of the *Kushán*," which the Chinese say was taken by the Indo-Scythian leader.

Dr. Hoernle notes that the title of Koiranos means more particularly a "military chief." But this term could not have been applied to the Indo-Scythian kings, as we learn from the Chinese that somewhere about A. D. 220 the Great Yuë-ti "put their kings to death, and *substituted military chiefs*." It seems clear, therefore, that BACIAEYC BACIAEON KANHPKOY and *Rao nano Rao Kanerki Korano*, could not have been a "military chief."

*Coin of Hoverki or Huvishka.*

This is a single specimen of a very common coin of *Hoverki*. I notice that Dr. Hoernle reads the name as *Hvirki* : but the common form is OOHPKI and if the first O be aspirated, the second O may stand for V. On a few coins the name is spelt OYOHPKI, which can only be intended for *Huverki*.

*Roman coins.*

The three Roman coins found in the Ahin-posh Tope are of great importance in fixing a limit to the antiquity of the structure. These coins belong to Domitian, Trajan and the Empress Sabina, the wife of Hadrian. As the last only is of consequence in dealing with the date, it is necessary to ascertain as nearly as possible the period to which her coin may be assigned. On it she takes the title of *Augusta*, which Orosius says she received at the same time as Hadrian was called *Pater Patriæ*, which, as we learn from his coins, took place in the very first year of his reign, or A. D. 117. We know, therefore, from this coin of Sabina that the Stúpa of Ahin-



posh cannot be dated earlier than A. D. 120, and may possibly be as late as A. D. 140.

Regarding the Indo-Scythian coins, it is worthy of note that several of the specimens of Wema Kadphises are so very much worn as to have lost 10 grains in weight. Some of Kanishka's coins also are much worn, and the single specimen with Salene on the reverse has once had a ring for hanging it from the neck. The single coin of Huvishka is in very good preservation.

If we regard these Indo-Scythian coins as contemporary with those of the Roman Emperors, then Wema Kadphises cannot be placed much earlier than the reign of Domitian, or about A. D. 70 or 80, while Kanishka and Huvishka would be assigned to 100 and 130 A. D. But I do not consider that there is any absolute necessity for making these Indo-Scythian Princes contemporary with the building of the Stúpa. From all that I have seen of their gold coins I am inclined to think that they must have continued in circulation for more than a century before the issue of the coinage of the later Princes bearing Sanskrit letters. This view is strongly supported by the statements of the Chinese authorities which place the assumption of supreme power by the "king of the Kusháns" not later than B. C. 26; and though they say that he was 80 years of age when he died, it is clear that his son *Yen-Kaoching*, or *Wema Kadphises*, ought to have succeeded to the throne before 25 A. D.

Amongst the plaster fragments from the Ahin-posh Stúpa which I have lately received there is one which, in the absence of the coins, would be sufficient to prove that the Tope was built during the period of Roman ascendancy. This fragment is the corner of a *Roman Ionic capital*. The volute is there, although it has no projection, but the capital is exactly the same on the two adjacent faces, which agrees with the Roman Ionic order, and differs entirely from the Greek. Apparently the whole of the pilasters of the Stúpa must have been of this style, as the size of the capital exactly fits their shafts. In the accompanying Plate (see Plate XI) I have given a restored sketch of this capital with the base of one of the actual pilasters of the Stúpa, as they now stand.

In the same Plate I have inserted several other fragments, some of which I have been able to restore as small examples in plaster of the Indo-Persian and Indo-Corinthian Pillars. Amongst the fragments also there are two acanthus leaves, each with a figure of Buddha seated upon it, as in the fine stone capitals which I have already made known. There are many pieces of large leaves, and of small flowered ornament; but I have found it impossible to fit any two of them together. The stucco of all these fragments is remarkably hard and heavy. All the small pieces were made in

moulds, and laid upon coarse canvas cloth to set. This was most probably done intentionally, as the rough back of the cast would adhere more firmly to the wall when it came to be fixed.

DR. HOERNLE said—

The principal objections of Major-Genl. A. Cunningham to my notices of the coins seem to be those referring to the interpretation of the Arian Pali legend on the coins of Kadphises, and of the word *Korano* on the coins of Kanerki. As to the first, I did not claim the interpretation given by me either as my own or as something new. I mentioned it as being the best of the interpretations hitherto given, and I took it in the main from E. Thomas, who, as I said, does not mention its author. I did not know then, that it was substantially the one given by Genl. Cunningham. I sincerely regret the circumstance; as I should not wish to appear to fail in rendering to Genl. Cunningham that high consideration to which, on account of his long-continued and very successful labours in the cause of Archæological Science, he is so fully entitled at the hands of all who follow similar pursuits. My contribution consisted in the reading of *sagda* for *sarva*. The latter, I admit, accords well with the characters as traced on coins Nos. I to IX. But on No. X the conjunct is traced differently. They may be merely two different forms of the same conjunct (*rv*). In any case the variety is worth noting.

As to *Korano*, I was not unaware of the explanation referred to by Genl. Cunningham. It was in my mind, when I wrote the remark about Lassen. I took it from Lassen, who, I think, omits to mention that he had it from Genl. Cunningham. I can only repeat my sincere regret, that I was misinformed as to the authorship of the explanation. But I must still think, as I thought then, that the identification of *Korano* with *Kushano* has not been satisfactorily made out. I do not say that the identification of *Korano* with *Koiranos* is quite satisfactory either. I only ventured to express the opinion, that the latter identification may yet prove to be correct. The mainstay of the other theory appears to be a certain assumed "peculiar law of the Turki language by which *sh* and *z* are changed to *r*." It is not quite clear, whether this means that what is *sh* or *z* in Turki becomes *r* in Greek; or what is *r* in Turki becomes *sh* or *z* in Pali; probably the former. In either case it does not seem to me, that we really know what the Turki sound was. We have the corresponding sets of names: *Kanerki*, *Hverki* and *Kanishka*, *Huvishka*. Of these, I suppose, the former is the Greek, the latter the Indian equivalent of a Turki name; and clearly the Greek *r* corresponds to the Indian *sh*; but what the Turki sound may have been, which they both equally represent, it seems to me, we do not know. But admitting that law for the sake of argument,

the example just quoted would prove the law only with regard to the interchange of a *conjunct sh* and *r*; but not as regards *single medial* or *single initial sh* and *r*. In *Kushana* = *Korano*, the letters in question are single medial; in *zavu* = *ráo* they are single initial. Letters in such different positions may not, *primá facie*, be treated alike. But further, *zavu* = *ráo* does not appear to me to be an illustration of the law at all. *Závu*, I suppose, must represent a Turki word; so does *ráo*, if it be identical with *závu*. Now as far as I know, both *zavu* and *ráo* always occur in legends written in Greek characters. It would appear then, that in this case the Turki initial sound, whatever it was, became in Greek (*i. e.*, when it was expressed by a Greek letter) *z* at an earlier period, and *r* at a later period. In the Arian Pali the word appears in the form *yaiiasa*; so that we should get here three interchangeable letters (when single initial), *viz.*, the two Greek *z* and *r* and the (Indian or) Pali *y*, all three equally representing some unknown Turki sound. Or again, if it be said, that *ráo* though written in Greek, gives the Indian pronunciation of the same Turki word, which by the Greeks was pronounced and written *zavu*;—in this case we have an Indian *r* interchangeable with a Greek *z*, both representing some unknown Turki sound (besides being equivalent to a Pali *y*); that is, we have a case precisely the reverse of that seen in *Kanishka* = *Kanerki*. Add to this, that it does not seem probable, that *ráo*, standing as it does in close connexion with *raonano*, should not be the well-known Indian word *ráo*, but another form of *zavu*. But whether *zavu* = *rao* be or be not true; it does not strictly prove the case of *Kushana* = *Korano*; in so far as the letters do not occupy analogous positions in the two sets of words. I may add that supposing *Korano* to be *Kushána*, it seems strange that the word does not occur in the titles of Kadphises, while it occurs in those of his predecessor (Kadaphes) and his successors Kanerki and Hverki; yet all belong to the same tribe. If Kadphises dropped it as unnecessary, why did his successors revert to it? I do not deny that the identification of *Kushána* with *Korano* may yet be proved to be correct; it only seems to me that the evidence hitherto produced does not warrant it. On the other hand, I confess, I cannot understand, why a great king like Kanerki should not have borne the lesser title of "military chief," beside the more imposing "king of kings"; just as, now-a-days, I believe Khán may be found joined with Sháh, or the like. This is not incompatible with the fact, that in later times there were not allowed to be any kings, but only military chiefs.

The remaining points are of less importance. It is very possible that the obscure marks under the bust of Kadphises represent clouds. If so, their apparent resemblance to Greek letters on two of the coins is merely a curious accident. On this point as well as on the following, General

Cunningham's wider experience of such coins must be decisive. I did not, however, ascribe the androgynous figure of Siva to Nos. I—IX, but only to No. X.

No. XIV, with CAAHNNH, is not a unique, as General Cunningham himself possesses two specimens; one of which, as I have since been informed by him, is in even better preservation than the one found in the Ahin-Posh Tope. I cannot, however, make out, whether or not it has been also published. If not, its publication and description now will be welcome to Numismatists.

The name OOHPKI I transliterated *Hvirki*, because I took the first O to represent the aspirate consonant *h*, and the second O the semivowel *v*, that is, OO to represent the conjunct consonant *hv*. Such a conjunct would naturally admit of the slight variations *huv* or *hov*, as in the form OYOHPKI.

As to the age of the Ahin-Posh Tope, General Cunningham places it in the first half of the 2nd century A. D. I was inclined to ascribe it to the first half of the 3rd century, principally to allow time for the travelling of the Roman coins to Afghanistan and their wear and tear; the SABINA is considerably worn. I do not think we ought to reduce this time too much. But the margin allowed by me may have been too large. Perhaps the 2nd half of the 2nd century A. D. will be a safe date.

5. *A Translation of a Copper-Plate Inscription from Nirmand, in Kulu, with a note on the same.*—By RĀJENDRALĀLA MITRA, RĀI BAHĀDUR, C. I. E., LL. D.

In May, 1878, Major W. R. M. Holroyd, Director of Public Instruction, Panjab, forwarded to the Society a photograph of a copper-plate grant found in the temple of Parashurāma at Nirmand, in Kulu, together with reports on that sanctuary by Messrs. Lyall and Clarke. The photograph, however, was too indistinct to be easily read, I therefore requested a sight of the original, which he subsequently favoured me with. The plate measures 18 × 8 inches. Its left hand corners are broken, the right hand ones rounded, the margins are irregular, and the surface uneven, showing that very little care was taken to prepare it for inscription. In the middle of both the upper and the lower edge, there is a hole for a ring which probably bore the donor's seal and another plate intended to serve as a cover for the inscribed face. The letters on the monument are but slightly scratched, and very shallow and indistinct.

The inscription extends to sixteen lines, inscribed longitudinally. The letters at the beginning of the first three lines as also a few here and there, are obliterated, and the last two lines are unintelligible. The rest, however, is clear enough, and easily read. The letters are of the Gupta type,

and must date from the 4th or the 5th century A. D. There is, however, no date in the record to verify this conjecture.

The purport of the document is the grant of a village named Súlisa to a Bráhmaṇ of the School of the Atharva Veda, for the use of a temple dedicated to S'iva, by a queen named Mihiralakshmi. Her son Samudrasena is the donor. He was a Bráhmaṇ, who assumed to himself the title of *Mahásamanta*, "great commander," and *Mahárájá*, "great king;" these titles are also assigned to three of his ancestors, whose names are, in the ascending series, (1) Ravisena, (2) Sanjayasena, (3) Varuṇasena. Who these worthies were I cannot ascertain. They were probably petty chieftains of the Panjab, where even at that early date Linga worship had become widely prevalent.

#### *Translation.*

Born in the year — of the celebrated king, of him, whose glorious deeds had spread far to the four oceans, whose feet had become resplendent with the reflection of the crown-jewels on the bended heads of many chiefs of great armies, who had celebrated great sacrifices, of the mighty commander and great king S'ri Varuṇasena. His son and successor, born of her majesty Praváliká, the great goddess, (was) his father's rival in merit, the mighty commander, and great king S'ri Sanjayasena. His son and successor, born of her majesty S'ikharasvámíní, the great goddess, (was) the hero of a hundred battles, the mighty commander, and great king S'ri Ravisena. His son and successor, born of her majesty S'ri Mihiralakshmi, the great goddess, (was) the delighter of mankind like the autumnal moon, the bestower of gifts to those who are overpowered by powerful enemies, the kind to the poor, the merciful to the decrepit, the great devotee of Mahes'vara, the great Bráhmaṇ, the devoted friend, the mighty commander, and great king S'ri Samudrasena. He, for the enhancement of the virtue of his mother Mihiralakshmi, and for the service of the lord, the destroyer of Tripura, the giver of light to the world, the beneficent to those who bow to him, \* \* \* the divinity established at Kapiles'vara, and named after his mother Mihires'vara, *alias* Kapáles'vara, for his daily supply of sacrifices, boiled rice, offerings, flower garlands, incense, aromatics, lamps, and for occasional repairs, to Stoma, a Bráhmaṇ of the school of the Atharva Veda \* \* \* has granted, for the period of the duration of the sun, the moon and the stars, the village of Súlisa, extending as far as the dependencies\*

\* The boundaries described are unintelligible to me. The word *Kuṭumba* is in Sanskrit usually employed to indicate a kinsman, it does not mean a dependency in the sense of an adjoining piece of land, but it has been repeatedly so used in the text as to leave me no alternative but to use it in the latter sense. The names of the places are such as to be quite unintelligible.

of Vakkhalika in Navavaidila, including the grazing ground of Paribhuta in the dependency of Phakkasvatálápur, and the dependencies of Salabha, as also the ground in the village of Súlisa presented by Mahārāja Sarvadharmā, the first founder of (the temple of) Kapāles'vara, and the plot of ground granted by my mother Mihiralakshmi, with all its level lands, waters and jungles, along with its inhabitants, its hills, its boundaries, its grass and timber, its water-courses, and religious buildings. Knowing this it should be the duty of (all future) kings and their dependants, whether of my kingdom or otherwise, for the good of all to uphold this (grant); for whoever will undo, or set it aside, or rob it, will be guilty of the five great sins as well as of all minor sins. It has been said, "Many kings including Sagara and others, have owned the earth: to whomsoever the earth belongs for the time being, to him belongs the fruits (of such gifts). The donor of land enjoys heaven for sixty thousand years, and for so many years the destroyer and resumer thereof dwells in hell. Whosoever resumes land, whether given by himself or by another, is born a maggot in ordure for sixty thousand years." This was written in the presence of Nihilapati and Kus'alaprakās'a, by Udyotārka. (The last two lines are unintelligible.)

*Transcript in Nāgarī Character.*

- १। — भिख्यातनरपतिवर्ष(र्ष)जः समभवच्चतुर्दधिसमतिक्रान्तकीर्तिरनेक-  
सामन्तोत्तमेत्तमावनतसुकुटमणिमयूखविष्कुरितचरणारविन्द-
- २। — क्रतुयाजो महासामन्तमहाराजश्रीवरुणसेनस्तस्य पुत्रस्तत्पादा-  
नुध्यातः परमदेव्यां प्रवलिकाभट्टारिकायामुत्पन्नः पित्रैव तुल्योगुणैर्म-
- ३। हासामन्तमहाराजश्रीसञ्जयसेनस्तस्य पुत्रस्तत्पादानुध्यातः परमदेव्यां शिख-  
रखामिनीभट्टारिकायामुत्पन्नः समरशतलब्धजयः × × म-
- ४। हासामन्तमहाराजश्रीरविषेणस्तस्य पुत्रस्तत्पादानुध्यातः परमदेव्यां श्रीमि-  
हिरलक्ष्मीभट्टारिकायामुत्पन्नः शरदमलसकलरजनिकर इव प्राणि-
- ५। नां समाह्वानकरः समुन्नताशेषरिपुराशिव(म)ताम् प्रार्थितफलप्रदो दीन-  
नाथातुरदयालुः परममाहेश्वरोतिब्रह्मण्यः परार्थैकरतो महासामन्त-
- ६। महाराजश्रीसमुद्रसेनो जननीश्रीमिहिरलक्ष्म्या धर्मार्थं भगवत्स्त्रिपुरान्त-  
कस्य लोकालोककरस्य प्रणतानुकम्पिनः सर्व + + + यकरे(?) कपाले-
- ७। श्वरे जननीप्रतिष्ठितस्य श्रीमिहिरेश्वरस्य कपालेश्वरबलिचरुसत्रसङ्घपूगन्ध-  
दीपिदानाय सततं श्रीसुखण्डस्फुटितसाधनाय च नि-
- ८। म्मण्डा(भ्या?)याहाराथर्व्यज्ञास्त्रास्त्रोत्तमाय ह्यलिसयामनववैदिककर्मान्तव-  
क्वलिककुटुम्बितादेसभूमिपर्यन्तपरिभूतनाम्ना फक्कश्वतालापुर-



- ६। कुकुटुम्बितादेसभूमीसोद्ग्राससीमान्तपर्यन्तसलभकुकुटुम्बदिन्तुकुटुम्बश्च ।  
कपालेश्वरदेवस्य पूर्वप्रतिष्ठायां महाराजसर्वधर्मेण भु(भू)मी दत्ता ।  
सूलिसग्रामस्य श्रीमिहि-
- १०। रत्नप्रस्तस्याः समैदकजार्गल\* भूमीसमेतमशेषं सप्रतिवासिजनसमेतं सो-  
द्ग्रे† खसीमटणकाष्टप्रखवणयूतीपर्यन्तं देवाग्रहारश्च ता(?) च-
- ११। न्नार्कतारासमकालीनं प्रतिपादयति स्म विदित्वैतज्जाजभिस्तदाष्ट(त्रि)तजने-  
नाधिकृतानधिकृतेन हितमिच्छता प्रतिपालनीया यस्त्वेवं कुच्यात् परिपश्यन-  
मपह-
- १२। रणं परोपद्रवं वा स पञ्चभिर्महापातकैरुपपातकैश्च संयुक्तश्च ॥ उक्तश्च बज्जमि-  
र्वसुधा भुक्ता राजभिः सगरादिभिः । यस्य यस्य यदा भूमिस्तस्य तस्य  
तदा-
- १३। फलं ॥ षष्ठिवर्षसहस्राणि स्वर्गे मोदति भूमिदः । आच्छेत्ता चानुमन्ता च  
तान्येव नरके वसेत् ॥ स्वदत्तां परदत्ताम्वा यो हरेत वसुन्धरां । षष्ठिवर्ष-
- १४। सहस्राणि विष्ठायां जायते क्षमिरिति ॥ स्थितोत्र मिहिलपतिः कुशल-  
प्रकाशश्च । लेखकोत्र उद्योत अर्काश्च गणसौख्यसधन × खे सुदिया(?)
- १५। राष्ट्रसमेतैश्चेयं दत्तिः परिपाल्या ये + + कात्र उद्यानस्थावरवादिचग-  
विश्वसहस्रउपलव-
- १६। कगललटटिकतद्वयमिहिरत्नप्रतिपादन इति

6. *Coins of Ghiás-ud-din and Mu'az-ud-din-bin-Sám.*—By DR. C. L. STULPNAGEL, Professor, Government College, Lahore.

(Abstract.)

This paper begins with a brief historical notice of Ghiás-ud-din of Ghor and his younger brother Mu'az-ud-din, the first Pathán king of Delhi. It then describes eight silver coins, bearing the joint names of those two rulers. One of them, dated 597, closely resembles No. 1, Pl. I, in Thomas' *Pathán Kings of Delhi*, differing only in bearing the date on the *Obverse*. Two others, dated 596, resemble No. 35, Pl. XX, in Wilson's *Ariana Antiqua*. The remaining five coins have never before been described and are quite of a new type. They are binominal; weight 75-77 grains. The area on either side is a square composed of double lines, with the inscription arranged in five lines. The enclosing margin, in four sections, is bounded by double circles. They are dated 596, 597 and 598 A. H. None contains the place of mintage.

This paper will be published in the Journal, Part I.

\* समोदकजार्गल (?)

† साद्रिग



of Vakkhalika in Navavaidila, including the grazing ground of Paribhuta in the dependency of Phakkasvatálápur, and the dependencies of Salabha, as also the ground in the village of Súlisa presented by Mahārāja Sarvadharmā, the first founder of (the temple of) Kapālesvara, and the plot of ground granted by my mother Mihiralakshmi, with all its level lands, waters and jungles, along with its inhabitants, its hills, its boundaries, its grass and timber, its water-courses, and religious buildings. Knowing this it should be the duty of (all future) kings and their dependants, whether of my kingdom or otherwise, for the good of all to uphold this (grant) ; for whoever will undo, or set it aside, or rob it, will be guilty of the five great sins as well as of all minor sins. It has been said, "Many kings including Sagara and others, have owned the earth: to whomsoever the earth belongs for the time being, to him belongs the fruits (of such gifts). The donor of land enjoys heaven for sixty thousand years, and for so many years the destroyer and resumer thereof dwells in hell. Whosoever resumes land, whether given by himself or by another, is born a maggot in ordure for sixty thousand years." This was written in the presence of Nihilapati and Kus'alaprakāśa, by Udyotārka. (The last two lines are unintelligible.)

*Transcript in Nāgarī Character.*

- १। ————भिख्यातनरप्रतिवर्ष(र्ष)जः समभवच्चतुर्दधिसमतिक्रान्तकीर्तिरनेक-  
सामन्तोत्तमोत्तमावनतसुकुटमणिमयूखविच्छुरितचरणारविन्द-
- २। —————क्रतुयाजो महासामन्तमहाराजश्रीवरुणसेनस्तस्य पुत्रस्तत्पादानु-  
ध्यातः परमदेव्यां प्रवलिताभट्टारिकायामुत्पन्नः पित्रैव तुल्यो गुणैर्म-
- ३। हासामन्तमहाराजश्रीसङ्गयसेनस्तस्य पुत्रस्तत्पादानुध्यातः परमदेव्यां शिख-  
रखामिनीभट्टारिकायामुत्पन्नः समरप्रतलब्धजयः × × म-
- ४। हासामन्तमहाराजश्रीरविषेणस्तस्य पुत्रस्तत्पादानुध्यातः परमदेव्यां श्रीमि-  
हिरलक्ष्मीभट्टारिकायामुत्पन्नः शरदमलसकलरजनिकर इव प्राणि-
- ५। नां समाल्लदनकरः समुन्नताशेषरिपुराशिव(म)ताम् प्रार्थितफलप्रदे दीन-  
नाथातुरदयालुः परममाहेश्वरोतिब्रह्मण्यः परार्थैकरतो महासामन्त-
- ६। महाराजश्रीसमुद्रसेनो जननीश्रीमिहिरलक्ष्म्या धर्मार्थं भगवत्स्त्रिपुरान्त-  
कस्य लोकालोककरस्य प्रणतानुकम्पिनः सर्व + + + यकरे(?) कपाले-
- ७। श्वरे जननीप्रतिष्ठितस्य श्रीमिहिरेश्वरस्य कपालेश्वरबलिचरसत्रस्रग्धूपगन्ध-  
दीपिदानाय सततं श्रीसुखखण्डस्तुतिसाधनाय च नि-
- ८। र्मखडा(श्या?)ग्राहाराथर्व्यब्राह्मणलोमाय सूलिसग्रामनववैदिककर्मान्तव-  
क्वलिककुटुम्बिताद्वेसभूमिपर्यन्तपरिभूतनाम्ना पक्कश्वतालापुर-

- ६। ककुटुम्बिताद्वेसभूमीसोद्रगाससीमान्तपर्यन्तसलभककुटुम्बदिन्तकुटुम्बश्च ।  
कपालेश्वरदेवस्य पूर्वप्रतिष्ठायां महाराजसर्वधर्मेण सु(भू)मी दत्ता ।  
सुखिसग्रामस्य श्रीमहि-
- १०। रत्नलक्ष्मिस्तस्याः समेदकजार्जल\* भूमीसमेतमश्वे सप्रतिवासिजनसमेतं सो-  
द्रगै† स्वसीमदणकाष्ठप्रखवणयूतीपर्यन्तं देवाग्रहारश्च ता(?) च-
- ११। नार्कतारासमकालीनं प्रतिपादयति स्म विदित्वैतद्राजभिस्तदाष्ट(त्रि)तजने-  
नाधिकृतानधिकृतेन हितमिच्छता प्रतिपालनीया यस्त्वेवं कुच्यात् परिपश्यन-  
मपह-
- १२। रणं परोपद्रवं वा स पञ्चभिर्महापातकैरुपपातकैश्च संयुक्तश्च ॥ उक्तञ्च बज्जभि-  
र्वसुधा भुक्ता राजभिः सगरादिभिः । यस्य यस्य यदा भूमिस्तस्य तस्य  
तदा-
- १३। फलं ॥ षष्ठिवर्षसहस्राणि खर्गे मोदति भूमिदः । आच्छेत्ता चानुमन्ता च  
तान्येव नरकं वसेत् ॥ स्वदत्तां परदत्ताम्वा यो हरेत वसुन्धरां । षष्ठिवर्ष-
- १४। सहस्राणि विष्ठायां जायते क्वमिरिति ॥ स्थितोऽत्र मिहिलपतिः कुशल-  
प्रकाशश्च । लेखकोऽत्र उद्योत अर्काश्च गणसौख्यसधन × खे सुदिया(?)
- १५। राष्ट्रसमेतैश्चेयं दत्तिः परिपाल्या ये + + काच उद्यानस्थावरवादिचग-  
विश्वसहस्रउपलव-
- १६। कगललटटिकतद्द्वयमिहिरत्नलक्ष्मिप्रतिपादन इति

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(Abstract.)

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This paper will be published in the Journal, Part I.

\* समेदकजार्जल (?)

† साद्रिग

7. *Notes on a Collection of Reptiles and Frogs from the neighbourhood of Ellore and Dumagudem.*—By W. T. BLANFORD, A. R. S. M., F. R. S., F. G. S.

(Abstract.)

In this paper 33 species of reptiles and 7 frogs are enumerated. They were collected on the Godáviri, near Dumagudem (the engineering station at the first barrier) or between Dumagudem and Ellore, in the months of February, March, April and May, 1871. The new species were described by Dr. Stoliczka and some notes have been published, but others remain, and as these throw some light on geographical distribution or on the habits and structure of the animals, they are included in the present paper. The list of lizards (15 species) is doubtless much more nearly complete than that of the *Ophidia* and *Batrachia*.

This paper will be published in the Journal, Part II.

8. *Notes on a Collection of Reptiles made at Ajmere, in Rájputána,* by MAJOR O. B. ST. JOHN, R. E.—By W. T. BLANFORD, A. R. S. M., F. R. S., F. G. S.

(Abstract.)

In this paper 24 species of reptiles collected or observed by Major St. John at Ajmere, are enumerated. The most interesting are a *Varanus*, supposed to be a variety of *V. lunatus*, with reference to which the distinctions between *V. dracæna* and *V. lunatus* are discussed; *Ophiops microlepis*; *Euprepes monticola*, (proposed to be re-named *E. guentheri*, as the original name is misleading); *Hemidactylus triedrus* (?); *Cynophis helena* and *Python molurus*. It was not previously known that the two last named genera were found in Central India.

This paper will be published in the Journal, Part II.

9. *Notes on Reptiles.*—By W. T. BLANFORD, A. R. S. M., F. R. S., F. G. S.

(Abstract.)

This paper contains a few desultory notes on various species of lizards and snakes, collected in different parts of India and the neighbouring countries. The only form described as new is a species of *Hypsirrhina* from Pegu, thus distinguished.

*HYPsirrhina maculata*, sp. nov. Near *H. Chinensis*, but differing in having 25 rows of scales instead of 23 and only 125 ventrals. Head short, snout blunt, truncated, tail compressed. The prefrontal is rather

smaller than either of the postfrontals; præocular 1; postoculars 2. Colour ashy brown with a row of large irregular black spots down the back and another rather smaller row on each side; under parts whitish with a dusk band down each side of the ventral shield.

The single specimen examined is 12 inches long and was sent from Bassein in Pegu by Captain Spearman.

MAJOR WATERHOUSE said that before the meeting closed he wished to say a few words, to express the regret of the Society that they were about to lose the services of their President, Mr. W. T. Blanford, who was going on leave to Europe almost immediately, and this was the last occasion on which he would be present among them for some time. He need not enlarge upon Mr. Blanford's labours and the support he had given to the Society during his long connection with it, as they were sufficiently evidenced by the number of papers from his pen that had been published in the Society's Journal. But he could not allow Mr. Blanford to leave without a warm acknowledgment of the cordial help he, as Secretary, had always received from him, and of the care and attention he had devoted to the interests of the Society during the time he had been President. He would therefore beg to move that the thanks of the Society be given to Mr. Blanford for his services as President.

The vote was carried unanimously.

The receipt of the following communications was announced:

*Geographical Information regarding the Kirghiz Steppes and country of Turkistan, afforded by the Book of the Great Survey.*

*Alphabetical Index to the Geographical Names in the Kirghiz Steppes and in the country of Turkistan which are contained in the Book of the Great Survey.*

*Information regarding the Freezing and Thawing of the Waters of the River Yenisei below the town of Yeniseisk.*

*Sketch of the Geographical Investigations in Asiatic Russia. Translated from the Russian of Venukoff.*

The above are translations of papers in the Proceedings of the Imperial Russian Geographical Society, by CAPT. W. E. GOWAN, H. M.'s Indian Army.

*Notes on the Survey Operations during the Afghan Campaign of 1878-79. Compiled by MAJOR J. WATERHOUSE. Communicated by Major-General J. T. WALKER, C. B., R. E., Surveyor General of India.*

*Note on an Inscription from the Gate of the Krishna-Dváraká Temple at Gayá.*—By RÁJENDRALÁLA MITRA, RÁI BAHÁDUR, C. I. E., LL. D.\*

Three months ago I received from Mr. E. J. Barton, Collector of Gayá, an ink impression of an inscription existing on the gate of the Krishna-Dváraká temple in the neighbourhood of the Vishnupad at Gayá. In forwarding it, Mr. Barton said: "It appears that in the Buddhistic times, formerly there was a temple in which there were images of Krishna and Mahádeo. Fifty years ago it was pulled down by one Dámodar Dhokri Gyawál, and a new edifice built in its place. Many Bráhmans were sent for, and asked to decipher the inscription, which they could not do. I shall be much obliged if you can favour me with a translation of it." The inscription was not new to me, as I had seen it in 1864, and brought a facsimile of it. I did not, however, notice it, as my facsimile was very unsatisfactory, and I hoped to visit the place again and read the record *in situ*. General Cunningham noticed it in 1872, and published a facsimile in the third volume of the 'Archæological Survey Reports' (plate XXXVII). His account of it runs thus: "The inscription consists of 18 long lines of well-cut Kuṭila characters. It opens with the invocation—*Aum namo Bhagavate Vāsudevāya*, and ends with *Kirtti*. Near the end of the last line is found the Rájá's name, S'ri Naya Pála Deva, and the year of his reign, *daśapanche Samvatsare*, the 15th year. This inscription, with the exception of a few slight injuries in the middle, is in excellent preservation, and is a fine specimen of sculptured lettering. As it is not mentioned by Buchanan in his account of the temple of Krishna Dváraká, it was most probably discovered after his time; but under any circumstances it has no connexion with the temple to which it is now attached."

Judging from the reduced facsimile published by General Cunningham, and the ink impressions taken by me and by Mr. Barton, the record appears to be far from being "in excellent preservation." There are breaks in almost every line, and lines 10 to 15 are all but wholly illegible, my reading and translation of the record are, therefore, very fragmentary, and far from being satisfactory. As the record, however, is of the time of the Pála Rájás of the 11th century and bears a date, it is worthy of preservation even in its fragmentary state.

The idea of its being a Buddhist record has arisen from its being connected with the Buddhist Pálas; but from what I have been able to make of it, it has nothing to do with Buddhism. It opens with an invocation to Vāsudeva, or Krishna, and distinctly names Vishṇu as the divinity for whom the temple which bore it was built. It goes further, and mentions the blue colour and the yellow raiment of the divinity. Around this temple

\* Read at the July Meeting.

there were several minor ones, erected at the same time for the accommodation of lingams.

The dedicator of the temple was one Soma, a petty zamindár, who could venture to assume only the very moderate and equivocal title of *adhīpa*. His genealogy as given in the record included the names of several generations; but, six lines in the middle being illegible, I cannot guess how many names have been lost. The founder of the family was an adorer of Śiva, but his name, apparently one of two syllables, is illegible. His son was Śúdraka, and grandson Vis'vāditya. Soma was the descendant of the last, some unknown generations removed.

The only remarkable circumstance connected with the last was the encouragement he gave to the study of Sahadeva's treatise on the veterinary art. Whether Sahadeva wrote anything himself on the subject or not, does not appear. I have by me two codices of a work on the diseases of horses by Nakula, and have seen the treatise quoted in other works on the subject, but I have never heard of Sahadeva having been an author. He was, however, the twin brother of Nakula, and the two were the natural sons of the celestial veterinary surgeons, the two Aśvins, and it is very likely that the work of Nakula also passed in the name of his twin brother.

According to the calculations published by me in my paper on the Pála Rájás (Journal for 1878) Nayapála began his reign about the year 1040 A. D., immediately after Mahipála, and was the person from whom Vijayasena wrested the kingdom of Northern Bengal. The fifteenth year of his reign fell in the middle of the sixth decade of the 11th century.

The engraver of the record was one Saththasoma, and the size of it is 30 × 13 inches.

#### *Translation.*

Line 1. Om. Salutation to the Lord Vásudeva. May that Vishṇu, whose body is as resplendent as a multitude of new-blown blue lotuses, whose yellow robe is charmingly bright like gold, (whose praise) is sung ——— (preserve) you.

2. Having made the Bráhmans happy with whatever they wanted, the lord of the people, adorned with every good quality, and residing with the highest glory as if in heaven, himself prepared a material image of Vishṇu, and unbarred the gate of salvation by high temples, charmingly white as the cloud of autumn.

3. They sing ——— Resounding the loud voice of the Bráhmans reciting the Vedas ——— further, the air was darkened by volumes of smoke emanating from the incessant homa offerings. Where virtue ———

4. has found an asylum from the dreadful fear of Kali in this age. With highly-prized social qualities, exquisitely beautiful, the noble Bráhma-man ———

5. He, who was the noblest of Bráhmans, because stainless, (or who bears on his head a stainless moon,\*) who was adorned with various ornaments, (or profusely smeared with ashes,) who was the adorer (or beloved) of the daughter of the mountain king (Durgá), was named ——— With many unrivalled lofty temples the source of three-fold blessings dispersed in various parts

6. of the earth, and resplendent as the nectariferous light of the autumn, his glory was enveloped. Of him was born Súdrika, the delight of Bráhmans and his dependants, himself dependent on none, (or master of the twice-born (bird), the son of Vinatá, and (the possessed of Lakshmi,) the protected of Lakshmi, who was like unto the enemy of Mura (Krishna).

7. By his fame, white as the Kunda flower seen in a distant garden, in the autumn season, the surface of the three regions was filled as with camphor, or smeared as with sandal-paste, or inundated as with the waves of the milky ocean.

8. True religion ——— good sense, as that of the priest of the gods, ——— resplendent with glory. These were his qualities. Viśvāditya was born his son.

9. And in him every thing found an asylum, ——— manly glory like the rising sun ———

10 to 15. (Illegible except a few words here and there.)

16. Pressing down the majesty of the (highest) peak of the Kailása mountain, his glory was ascendant, his fame was spotless as the driven snow, his body was comparable to the moon. Where, by the spotless rays of the autumnal moon on the top of the lofty peak ———

17. The treatise of Sahadeva, the veterinary surgeon, his work on the saving of life, which is like a mistress in the heart of a good man who is perfect in love, friendship, and pleasure. The self-earned glory of the king Śrī Soma

18. was made manifest by the clever artist Saththasoma. When the weight of the empire of the whole earth was borne by Śrī Nayapála Deva, in the year ten and five (fifteen) of his reign (*samvatasare*) this accomplished noble deed was recorded.

\* The matter of this and the following line is very obscure owing to the epithets used having been designed to serve as *double entendre* applying once to Śiva and Vishnu and next to the founder of the family and his son.



## Transcript in Nāgarī Character.

- १। ॐ नमो भगवते वासुदेवाय ॥ उन्निद्रनीलकमलाकरकायकान्तिः स्वर्णामि-  
रामश्चिरद्युतिपीतवासाः । उद्गास्यमानश्च ————— विष्णुः —————  
युष्मान् ॥
- २। व्यानिर्माय समस्तवस्तुसुखिनो विप्रान् प्रजानां पतिर्द्यौमध्यास्त इवात्मनैव  
परितो मूर्तिप्रपञ्चं दधत् । उत्तुङ्गैः शरदम्बसुभ्रशुचिभिः सौधैः कृतालङ्कृति-  
र्म्माक्षद्वारमनर्गलं ज-
- ३। गति सा × × तया गीयते ॥ वेदाभ्यासपरायणद्विजगणोद्गीर्णायपाठक्रमादु-  
च्चैरुच्चरितध्वनित्यतिकरैः ————— । किञ्चाजस्वितहोमधूमपटलध्वान्ता-  
वृतौ साम्प्रतं धर्म्मो
- ४। यत्र महाभयादिव कलेः कालस्य सन्तिष्ठते ॥ अद्यादृतैर्गुणनयैः — सन्दोह-  
सुन्दरमहाद्विजराज × × ॥
- ५। अजातलक्ष्मद्विजराजशेखरः समुन्नतो भूरिविभूतिभूषणः । बभूव धन्यो-  
गिरिराजपुत्रिकाप्रियोयमेघः परितो × सं × कः ॥ अनन्यसामान्यदिगन्त-  
मन्दिरैः त्रिवर्गसंसर्गिगुणा-
- ६। अयैर्जगत् । शरत्सुधाधामगभस्तिभास्वरैः समुन्नतैर्यस्य यशोभिरावृतं ॥  
द्विजवरविनतानन्दनिरन्यगतिकः समाश्रितो लक्ष्मण । तस्य तदनुतनुजन्मा-  
सुररिपुत्रिव शूद्रको भूतः ॥
- ७। दूरोद्यानशरत्सुधानिधिसुधाकुन्दाभिरामच्छविश्रितैः शुद्ध × × यशोभिर-  
भितो यस्य त्रिलोकीतलं । कर्पूरैरिव पूरितं मलयजत्रातैरिवालेपितं × ×  
क्षीरपयोधितुङ्गलहरीभेदैरिवाज्ञा-
- ८। वितं ॥ सद्यं धर्म्म ————— शुभा मतिः सुरगुरौ तेजस्विता भास्वति ।  
एते सन्ति गुणाः — विश्वादिद्यमजीजनत्सुतम-
- ९। सावेभिः समस्तैः श्रितं ॥ ————— उदयाश्रितोरविरिव प्रौढप्रतापो-  
दय —————
- १०।
- ११। ————— चारविकलोजनो ————— यस्य श्रीः समुचितवि-
- १२। लासात् सुदयिनीय ————— उद्गीयमाना जनैः ।  
सानन्दोत्पलकं वि-
- १३। मानमसद्वदेवै ————— कुलानि प्राप्नुवन्ति  
निध-
- १४। नानिव — ॥ निनदन्निद ————— यस्य नयस्य वि ×

- १५। × ॥ आजन्मान्तक ————— सतिलकस्य  
 १६। ————— ॥ कलासाचलशृङ्गसम्भ्रममधः कुर्वत् प्रकर्षोदयप्रालेयद्युतिवन्दसुन्द-  
 रयशःचन्द्रोपमेयाद्यतिः । यत्रोत्तुङ्गशिखाग्रसङ्गतशरच्चन्द्रांशुशुभ्रश्रिभिः (?)  
 × × नूतनमञ्जरी + + + +  
 १७। ————— ॥ वाजिवैद्यसहदेवनिरुक्तिः तत्प्रशस्तिरियमसुनिदानं  
 प्रेमसौहृदसुखैकधरित्रीसज्जनस्य हृदये रमणीव ॥ श्रीमतोऽधिपसोमस्य  
 आत्मजन्मार्जितं यशः । उ-  
 १८ । त्वीर्यं कर्मणि श्रीमत्सदृशमेन शिल्पिना ॥ समस्तभूमण्डलराज्यभारमावि-  
 भ्रति श्रीनयपालदेवे । विलिख्यमाने(?)ना)दशपञ्चसंख्यसंवत्सरे सिद्धिमत्  
 सादुकीर्तिः ॥

*Geographical information, regarding the Kirghiz Steppes and Country of Turkistan, afforded by the Book of the Great Survey.\* Translated from the Russian by CAPTAIN W. E. GOWAN, H. M.'s Indian Army.*

The relations of our fatherland with the country of Turkistan are very ancient, for they date from a period prior to the formation of what is now the Russian Monarchy. The numerous hoards of Asiatic coins, relating to times between the 7th and the beginning of the 11th century (not later than the year 1012), that have been found in Northern Russia, in the tract of country stretching from the province of Kazan, (in which dwelt the Bulgarians of the Volga,) to the Baltic Sea and along the shores of that sea, testify that, during this period, an active trade was carried on between Central Asia and Northern Europe through the country which is now called Russia.† Some have supposed that this trade altogether ceased in the beginning of the 11th century in consequence of the fall of the Khazai Empire, which possessed the low lands of the Volga; a fall which followed the defeat of the Khazai Army by the Russian Grand Duke Sviatoslaf in the year 969. But in reality this trade did not entirely cease, it merely stood still and grew slack. For, at any rate, in the 12th and 13th centuries Khivan and Boukharian caravans made their way into Russia.‡ To our trade relations with Central Asia there were added, from the

\* Taken from Part I of Vol. XIV, of "Proceedings of the Imperial Russian Geographical Society."

† "Russia and Asia" by V. V. Grigorieff, St. Petersburg, 1876. See passages relating to the Cufic coins found in Russia and the countries bordering on the Baltic (1841).

‡ Bulletin du Congrès international des Orientalistes—Session de 1876, à St. Petersburg, 1876. See pages 54, 55.

latter half of the 13th century, those political events which ushered in the two-century dominion of the Mongol Tatars or Tartars over Russia. But with the throwing off of that yoke, the confines of our Empire advanced with swift strides and with that extension increased the influence of Russia in the East. In the 16th century the Government of Moscow subdued Kazan (1552) and Astrakhan. Since then the free Cossacks, by moving from the valley of the Don and settling on the Volga, the Yaik (1580), the Terúk and in Siberia, have extended still more the confines of Russia.

Our steady connection, both mercantile and political, with Central Asia has in the course of several centuries given us the power to enlarge by degrees the circle of our geographical knowledge of that part of the world. We have learnt much by questioning the natives of the countries of Asia both far and near who have visited us, but we have learnt still more from the journeys to such lands of our own countrymen. We, unfortunately, are not in possession of complete knowledge of all these journeys,\* much less of the geographical results of each of them. We therefore are not able to follow, step by step, the gradual collection of Russian geographical knowledge regarding Central Asia. Nevertheless we do possess a sufficiently full treatise of the knowledge obtained in the 16th century. This treatise must be reckoned the first complete and purely geographical work put together in Russia. We allude to the Chart of the entire Sovereignty of Moscow and of the adjacent countries, called "the Great Survey," and to the compilation explanatory of the Chart entitled "the Book of the Great Survey." The Chart has not come down to us, but the Book has been printed several times.

In the preface to the last edition of the Book of the Great Survey,† Spasski furnishes particulars as to the date of the completion of the Chart and of the explanatory book and of its later editions. The beginning of the Survey relates to the reign of John IV, who "in the year 1552 ordered the land to be measured and a survey of his kingdom to be made."‡ In the time of Borís Godoonóff, that is, in the last years of the 16th century, the Survey was enlarged, and during the reign of Michael Theódorovitch, or about the year 1627, the Ancient Survey "fell into complete disorder, so that henceforth it was not possible to determine the borders of the country

\* Amongst the number of such travels, the journey to the Khanates of Khiva and Boukhara of the Englishman Jenkinson in 1558-59 cannot of course be reckoned, even though it was carried out from Moscow, and this because it belongs more to Europe than to Russia. If moreover it had an influence on the circle of our information regarding Central Asia, that influence was very limited.

† The Book of the Great Survey spoken of was issued, under the auspices of the Imperial Society for inquiring into the History and Antiquity of Russia, by Spasski. Moscow, 1846.

‡ History of Russia by Tatishsheff, Vol. I, page 506.

by an examination of it." It then became indispensable "by adhering to the measurements of the old Survey to make out a new Chart of the entire Sovereignty of Moscow and of all the districts of the kingdom." It was thus that the Book of the Great Survey came to be compiled, a work which, as already has been said, is explanatory of the Chart. Both on the Chart and in the Book "the standard of measurement is calculated in versts." In the year 1680 the Survey was made afresh, with such amplifications as the then condition of Russia required. Later on, that is, in the year 1773, there was issued a work by M. N. I. Novikoff, entitled "Ancient Russian Hydrography." Again, in the year 1792 there appeared a description of the Survey of the year 1627. This was called "Book to accompany the Great Survey." In 1832, M. Yazikoff published first editions of both the two works last mentioned. Spasski, in his edition of 1846 (see note †, p. 223), availed himself not only of these publications, but also of eight manuscripts published during the close of the 17th century, *i. e.*, after the year 1680. All existing differences between the printed editions and those in manuscript in relation to proper names, number of versts, omissions, additions, &c., he has noticed in the observations at foot of the text, whilst the explanations concerning the various subjects mentioned in the text have been inserted at the end of the book.

Regarding the scale of measurements, Spasski is of opinion that the versts of the Great Survey do not always agree with the modern verst of 500 "sajens,"\* and that the former may in some cases measure as much as 700 and 1000 "sajens," and hence they should be corrected by copyists according to the more modern scale. When expressing this opinion, Spasski evidently knew nothing about the researches of Booktoff into the ancient Russian linear and itinerary† measurements, in which it is shewn that our verst in days of yore was made up of 500 sajens of 3 arshins or 7 feet.

The information regarding the Kirghiz Steppes and the Country of Turkistan takes up nearly a whole chapter (pp. 69-76) of the Book of the Great Survey. On p. 158 we find "hordes of nomad Cossacks, the land of Urgentch and the land of Boukhara mixed up with the river Yaik." Intelligence of this kind is met with too in other passages of the book (p. 151 and 217, 218). Spasski has appended notes to such passages (see pp. 59-71, 172 and 218, 219), and many other writers on Central Asia have also commented on several revelations of the book before us. But no one has yet thoroughly analyzed these revelations, and therefore many of them have escaped that attention which they have merited, whilst others again have either remained altogether unexplained or imperfectly

\* 7 English feet.—*Translator.*

† *Journal of the Minister of Home Affairs*, 1844. No. 11.

interpreted, owing no doubt to the insufficient knowledge of the country hitherto obtained. I propose, therefore, to thoroughly analyze the subject *de novo*, and shall compare much of what is written in the "Book of the Survey" concerning the Kirghiz Steppes and country of Turkistan with the modern information on the subject.

After a description of the Yaik, or the modern Ural, and of the tributaries on its right bank, we read (p. 69), "And opposite those rivers, on the left bank of the Yaik, is the mouth of the Izlay." Now in other passages of the book, this river is called the Ilez or the river of Ilek.

"Above the river Izlay, at the termination of the Arattova mountains, the river Vor issuing from Mount Urúk falls into the Yaik. From the same mountain issues the river Irgíz and falls into lake Akbashli." In another part of the book of the Great Survey, we read (p. 72). "Mount Urúk, which is 70 versts long, is distant from the Blue Sea (Sea of Aral), 300 versts. From this mountain issue three rivers; the Vor, which flows into the Yaik; the river Irgíz, which flows eastward into lake Akbashli; the river Hem, which flows towards the Caspian Sea and falls into the lake without descending to that sea." Mount Airúk, which has been very happily chosen for explorers, is the highest point in the Múgodjarski range and is equidistant (250 versts) from the mouth of the Or and from the north-west extremity of the Blue Sea or Sea of Aral. But in the "Book of the Great Survey," the appellation of mount Airúk is extended to the entire range which stretches 150 versts north and south. From the Múgodjarski mountains, which surround the peak of Airúk, there flow: to the north the river Or, to the east one mouth of the Irgíz, which is known as the Chit-Irgíz, and to the south the Emba.\*

The river Or falls into the Ural "at the extremity of Mount Araltova." But what is this mountain? Spasski supposes (*vide* his note 58) that this is the range which extends to the Sea of Aral; in other words that it is the Airúk or Múgodjarski range, but from three other passages in the work in which mention is made of Mount Araltova, one would sooner suppose that the range in question is that portion of the Ural chain which runs along the right bank of the river Ural and which terminates in the Guberlinski hills.

The river Irgíz falls into the lake, which in former maps and in the old description of the Kirghiz Steppes by Richkoff and Tevshin† is called Ak-Sakal-Barbi, a name somewhat similar to that given in the "Book of the Great Survey." But it is not known why on the newest Charts and in the

\* *Vide* Richkoff's "Topography of the Province of Orenburgh." St. Petersburg, 1762, Part I, page 214.

† *Vide* Tevshin's "Description of the Kirghiz-Cossack hordes and of the Kirghiz Steppes." St. Petersburg, 1832. Part I, page 82.

descriptions of Blaramberg\* the name of the lake spoken of should have been changed into Chelkar-Dengis, a designation common to many lakes in the Kirghiz Steppes. Blaramberg reckons that there are four Chelkars in the Orenburgh Steppes and Selverhelm says there are three† in the Siberian Steppes. The word "dengis," in Russian "móre" (a sea), is inserted in maps to denote either lakes of a considerable size, or to signify that the body of water alluded to has a bitter or brackish taste. In the more modern descriptions of the Orenburgh Steppes by Meyer, a lake in one place is called "Chelkar," and in another "Ak-Sakal-Taúp." The Kirghiz use the latter designation, whilst the Russians used to call a lake in those parts Ak-Sakal-Barbi. No doubt by mistake the word came to be applied to fresh water-lakes.‡ The "Book of the Great Survey" here goes on to speak for the second time of the mouth of the river Emba. Let us now turn to the further indications of this book relative to the river Irgíz and lake Akbash-li. (p. 69.)

"And opposite those rivers (the Urúk-Irgíz and others) the river Saúk falls into the same lake on the left side after receiving the waters of the Bozin-Hinchal-Ilgen." The omission from modern maps of the Saúk and Bozin does not give us the right to conclude that this indication is wrong. The conversion of Ak-Sakal-Barbi or Ak-Sakal-Taúp into Chelkar has already shewn us how completely without rule are names sometimes changed. In the word Ak-Sakal-Taúp we are supposed to hear still the sound of the Saúk of the "Book of the Great Survey." In like manner the fact that the names of the mountain Búzún Khán, and of the Búzún sands, which, whilst marked on Tevshin's map of the Kirghiz Steppes as more to the north than Ak-Sakal-Barbi, *i. e.*, about Polkoyak and Túrgaya, are altogether omitted from modern maps, shows that the name of the river Bozin was not an invention of the "Book of the Great Survey." We find in the following testimony of Abul Ghazi Bahádur Khán a confirmation of the existence of the river Saúk. Baty, on his return from Russia (about the year 1243), when assigning a lot to his youngest brother, Saiban Khán, says: "Thou wilt have the entire country, which lies between the possessions of my eldest brother Idyen my own: thou wilt pass the summer on the Irgíz-Saúk, or, Ilek and east of the Yaik almost to the Ural mountains and the winter in Kara Kúm Arakúm, on the banks of the

\* Military Statistical Review of the land of the Kirghiz-Cossacks of the Lesser Horde (*i. e.*, of the Trans-Ural Kirghiz of the Government of Orenburgh). St. Petersburg, 1848. (Page 66.)

† Selverhelm, "Military Statistical Review of the Kirghiz Steppes of Western Siberia." St. Petersburg, 1852. (Pages 29 to 41.)

‡ Materials for the Geography and Statistics of Russia, collected by officers of the General Staff. The Kirghiz Steppe, in the Government of Orenburgh by Meyer, (pp. 47 to 51). St. Petersburg, 1865.



Sir (Darya) and about the mouths of the Chú and Sari-sú.”\* Now from the newest maps these ancient names have disappeared, either at the will of the topographers who have surveyed the localities in question, or by the order of the leaders of successive expeditions or, finally, from some mere chance or other. Without attaching, therefore, any great importance to the absence from modern maps of the names noted in the “Book of the Great Survey,” it now remains to take stock of the indications of the book itself. We are told then that into the lake Ak-Sakal-Barbi, on the side opposite the mouth of the Irgíz, several streams fall. Now if these streams and their tributaries exist at all, they are too insignificant to be taken into account. Evidently, therefore, the remark does not refer to them. But, besides these rivers and the river Irgíz, in the basin of the Ak-Sakal-Barbi there remains but one river. This is the Túrgai, and the one in all probability represented by the name Saúk. This assumption is supported by the following facts. The rivers Túrgai and Irgíz merge at a point not far from their entrance into lake Ak-Sakal-Barbi, but which of them has the pre-eminence is the question. Tevshin gives the priority to the Túrgai. He says, “The lake of Ak-Sakal-Barbi is well known because into it falls one of the most considerable of the Kirghiz rivers, *viz.*, the Túrgai, which receives the waters of many other rivers and streams and amongst others those of the Irgíz.” In the face of such importance attached to the river Túrgai, it would not have been omitted from the “Book of the Great Survey,” a work in which details are given of many rivers much less important and far more distant, as, for example, the Jilanchik (p. 208), and consequently the Túrgai must have been known under another name. Besides which, according to the testimony of Tevshin, the lake Ak-Sakal-Barbi, as compared with its size during the latter half of the last century, has considerably diminished, and therefore in former times one can imagine that the rivers were independent of each other, that the course of the Irgíz was more to the east and that of the Túrgai to the west. These arguments, therefore, seem sufficient for us to recognize in the Túrgai the ancient river Saúk. If such is the case, the river Bozin-Hinchal-Ilgén resolves itself into the Ulikoyak, a considerable tributary on the right bank of the Túrgai.

At the end of the passage in the “Book of the Great Survey” which we are now examining, a repetition of the name Irgíz is observed, with the addition to it of the word Urúk. Now it has already been said that the river Irgíz falls into the lake (Ak-Sakal-Barbi). Hence when it is observed for the second time that the Urúk Irgíz falls into the same lake, reference must be made to that Irgíz which flows from Mount Airúk; in other words to the modern Chit-Irgíz which is the same for the lower portion of

\* *Histoire des Mongols et des Tatars*, par Abul Gházi Bahádúr Khán, par le Baron Desmaisons. St. Petersburg, (page 191).



the large or U'lú-Irgíz. It must of course too be borne in mind that, although not mentioned, there may be another Irgíz, the name given to the upper part of the U'lú-Irgíz. "And opposite those rivers of the Khvahinski, or Caspian Sea, and in front of Mount Urúk are the sands of Arakúm and Barsúk-Kúm." In another part of the book (p. 73), it is said "And towards the Blue Sea, 280 versts from the river Irgíz, are the sands of Barsúk-Kúm, across which the distance is 25 versts, the sands of Kara-Kúm being 200 versts from the Blue Sea. The sands of Kara-Kúm are 250 versts long and 130 versts broad, and these three sands are adjacent to the shores of the Blue Sea," which of the numerous sands in the southern part of the Kirghiz Steppe is called Arakúm. Here of course there may be a slip of the pen, as in several manuscripts Arakúm is designedly called Karakúm (*vide* note 2 of the "Book of the Great Survey"). Now there are two known Karakúms in the steppes, one more to the south of the Emba, where it enters the Caspian Sea, and the other in the angle formed by the lower portion of the Sir Darya and the north-east shore of lake Aral. But if we take into consideration the testimony above produced of Abul Gházi about the existence of an Ara-Kúm independent of Karakúm, and if we note that the text of the "Book of the Great Survey" shows there are *three sands* contiguous to lake Aral, whilst it speaks only of two, *viz.*, Barsúk-Kúm and Kara-Kúm, and finally, when we really observe three separate steppes, *viz.*, the Greater Barsúk, the Lesser Barsúk and Karakúm, we are brought to believe that for the sands of Arakúm is meant either the Greater or the Lesser Barsúk, most probably the latter. And for this reason they, from their measurements, are more likely to resemble the Barsúk spoken of in the book. The Greater Barsúk is contiguous to the north-west shore of the Sea of Aral and is distant from Chit-Irgíz (250 to 300 versts). It has a width of about 25 versts. The Lesser Barsúk, or as we will call it, the Arakúm, is adjacent to the Bay of Perovski, is distant from Chit-Irgíz about 200 versts, and has a width of about 10 versts. Finally, the sands of Kara-Kúm adjoin the Bay of Sara-Cheganak and therefore the statement regarding the distance between them and the sea is not comprehensible, and probably is caused by an error in the manuscript. The sands of Kara-Kúm extend in a direct line 225 versts from north to south, that is from lake Ak-Sakal-Barbi to the natural boundary of Mailibasli on the Sir Darya, and they also stretch more than 100 versts to the eastward of the Sea of Aral. The width of the northern portion of the Kara-Kúm sands is 200 versts.

Turning then again to Mount Airúk and to the rivers which flow out of it, we read on page 69 "Out of the same Mount Urúk flows the river Hem, and into this river, on the right bank, falls the river Temirsú. The river Hem, without descending to the Caspian Sea, a distance of 20 versts,

falls into the lake." Now the river Hem, by which is meant the Emba, flows from one of its two sources from the Múgodjarski mountains, receives, as has been said, on its right bank, the waters of the Temir and at a distance of 72 versts from the Caspian Sea begins to split up into branches. At 21 versts' distance from the same sea it again passes into the same bed, and then again divides into branches, of which there are two principal ones. These having diffused their waters into lakes fall into the Caspian Sea,\* "50 versts distant from the right bank of the Hem, is the Kainyar-Sakgiz which discharges its waters into another lake. The Kainyar-Sakgiz has a course of 200 versts." The river Sagiz towards its mouth flows parallel with the Emba and at a distance from it of 70 versts, and then without reaching the Caspian Sea is lost in the salt marshes of the Tentyak-Sor, which lie at the mouth of the Emba. The length of the course of the Sagiz is 375 versts† "420 versts below the river Vor, there flow into the Yaik through its left bank three streams without name. Between them there is a distance of 70 versts. Below these streams again the river Ilez enters the Yaik" just below Túrtebi, which we call the Salt Mountain, for in it they break salt. The distance along the river Ural between the mouths of the Ori and Ilek is 360 versts. During this extent there fall into the Ural, on its left bank, not three but more rivers.‡

*Alphabetical Index to the Geographical names in the Kirghiz Steppes and in the Country of Turkistan, which are contained in the Book of the Great Survey.—Translated from the Russian by CAPT. W. E. GOWAN, H. M.'s Indian Army.*

1. Akbashli, Akbashl, Akbalish. A lake.  
Ak-sakal-barbi or Ak-sakal-taúp, into which falls the river Irgíz.
2. Akkol. Lakes Ak-kúl, into which falls the river Jilanchik.
3. Aknúrgan. The town of Ak-kúrgan, between Turkistan and Tashkent, which does not now exist and the site of which is not known.
4. Amú-Darya, Amedariya. The right arm of the river Amú, which falls into the Sea of Aral. The Oxus. (*Vide* E. Schuyler's *Turkistan*.)
5. Ara-Kúm. The sands, probably the Lesser Barsúki, which border on the Sea of Aral.
6. The Araltova mountain. Aral-taú, probably the southern portion

\* Topographical Description of the river Emba, compiled by Sub-Lieut. Alekseyeff, of the Topographical Department, 1853. *Vide* Report of the Geographical Society, 1855. Part 15.

† Blaramberg. Page 54.

‡ Materials for the Geography and Statistics of Russia collected by Officers of the General Staff, also "the Cossack Force of the Ural." St. Petersburg, (page 36).

of the Ural range which stretch along the right bank of the river Ural to Orsk.

7. Arzas, Argas, Azar, Arzan, Arzar, Arza. The no longer existing stream between the Aral and Caspian Sea.

8. Arkan, Yarkan. A town beyond Turkistan, probably Otrar. (See Schuyler's *Turkistan*, Vol. I, page 68.)

9. Aspaga, Aspúga. One of the rivers which do not reach the river Ural, probably the Búldúrtí.

10. Barsúk Kúm. The sands of the Greater Barsúki, which border on the Sea of Aral.

11. The Great Nagai. A people dwelling in the western portion of the Kirghiz Steppes.

12. Bozin-Hinchal-Ilgen, Bozin-Hinchan-Ilgin, Bozin-Hinchal-Ilegen. A river, probably the Ulkoyak, the right branch of the Túrgai.

13. Búkhara. A town. (See Schuyler's *Turkistan*.)

14. Búzúvlúk. The river Búzúlú which falls into the Samara.

15. Vor, the river Or, which falls into the Ural at Orsk. (See Schuyler's *Turkistan*.)

16. Hem, the river Emba, which falls into the Caspian Sea. (See Schuyler's *Turkistan*.)

17. Zelenchik, Zilanchik. The river Jilanchik, which falls into Lake Ak-kúl.

18. Ilez, Izlay. The river Ilek, which falls into the Ural opposite the Iletsk settlement.

19. Iuder, Aider. A mountain and a Salt lake of the same name in the neighbourhood of the river Ural. The lake belongs to the Cossack settlements of the Ural.

20. Irgíz. The river which, after uniting with the Túrgai, falls into Lake Ak-Sakal-Barbi. (See Schuyler's *Turkistan*.)

21. Ishin. The river Ishim which falls into the Irtish.

22. Kagan. A town, probably the same as Kyat in the Khanate of Khiva.

23. Kainyar-Sakgiz. The river Sagiz (to the north of the Emba) which does not reach the Caspian Sea.

24. The Cossack Settlement (Kazáchi Goro-dok) on the island in the Ural, just above the point at which this river receives the waters of the Ilek. The history of this settlement is still an unsolved mystery.

25. Kazatski Horde. The people who call themselves Kazaks (Cossacks) but whom we call Kirghiz.

26. Kalmicks. Those who, in the 16th century, dwelt in Júngaria and the eastern portion of the Kirghiz Steppes.

27. Mount Karabas and the town of the same name on the hill. The

Tyan-Shan mountains and probably also the name given to the town of Samarkand. (See Schuyler's *Turkistan*.)

28. Karakúm, Parakúm, Arakomv, Arashka. The sands which border on the Sea of Aral and the river Sir. (See Schuyler's *Turkistan*.)

29. Karagol, Karagúl, or the Black Lakes. The lakes which form the mouths of the river Uil.

30. Mount Karachatov. The mountains of Karataú, a branch of the Tyan-Shan mountains, which stretch in a direction parallel with the course of the river Sir, and which terminate in the neighbourhood of Túlek.

31. Kenderlik, Kanderlik. Rivers which issue forth from the mountains of Ulú-Taú and which fall, the one into the river Sir, the other into the river Sari-sú. The first does not now exist and the second bears the name of Kingir.

32. Kizilbash country. Persia.

33. Kosh-Yaik. An island in the Ural above the mouth of the river Ilek. On this island there was a Cossack settlement.

34. Kúyei-Kúei. One of the rivers, probably the Kaltahaiti, which do not reach the Ural.

35. Oil. The river Uil which forms the lakes of Kara-kúl.

36. Sairyam. The town of Sairam, 20 versts to the east of Chimkent.

37. Sarsa-Súrsú. The river Sari-sú which before reaching the Sir Darya falls into Lake Telekúl.

38. Saúk. Probably the lower portion of the river Túrgai, after that river passes out of lake Sari-kop and until its confluence with the river Irgíz.

39. The Blue Sea. The Sea of Aral.

40. Sorili. Three rivers which flow out of Olú-Taú, of which the upper is probably the Ters-Ikkan which falls into the Ishim and the middle and lower the Sari and Kara Túrgai.

41. Súnak. The town of Saganak or Súnak, which lies beyond Túlek.

42. Súngúrlúk. The river, probably the Khobda, which falls into the Ilek through its left bank.

43. Sir. The river Sir Darya or Jaxartes. (See Schuyler's *Turkistan*.)

44. Tokshúr, Tashkún, Tashkúr. The town of Tashkent. (See Schuyler's *Turkistan*.)

45. Temirsú, Temir, Temerisú, Termisú, Temir. The river Temir which falls into the river Emba through its right bank.

46. Tobol, Tabol, Tabala. The river Tobol, which falls into the Irtish. (See Schuyler's *Turkistan*.)

47. Tústebe, Túrtebe or the Salt Mountain in the Iletck settlement.
48. Turkústan. The town of Turkistan.
49. Urús, Ugús, Agús. The river Oxus of the ancients, the Amú-Darya.
50. Mount Ulútov or the Great Mountain. The mountains of Ulúr-Taú on the borders of the Túrgai and Akmolin provinces.
51. The Khvahni Sea. The Caspian Sea. (See Schuyler's *Turkistan*.)
52. Urgentch, Urgetch. The town of Urgentch in the Khanate of Khiva.
53. Urgensk, Ungersk, Ungernsk, Urgechensk, the Urgevsck country. The country of Khiva.
54. Uruk, Urok, Urk, Oorak, Oorook, the Oorak Mountain, Airúk and commonly the Mugodjarsk mountains.
55. Urak-Irgíz. The river Chit-Irgíz taken together with the lower portion of the Ulú-Irgíz.
56. Yaik. The river Ural. (See Schuyler's *Turkistan*.)
57. Yasirvan. The town of Saúran, before coming to Turkistan.
58. Yangúrgan. The town Yani-Kúrgan between Turkistan and Tashkent which does not now exist and the site of which is not known.

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H. K. W. ARNOLD, ESQ.

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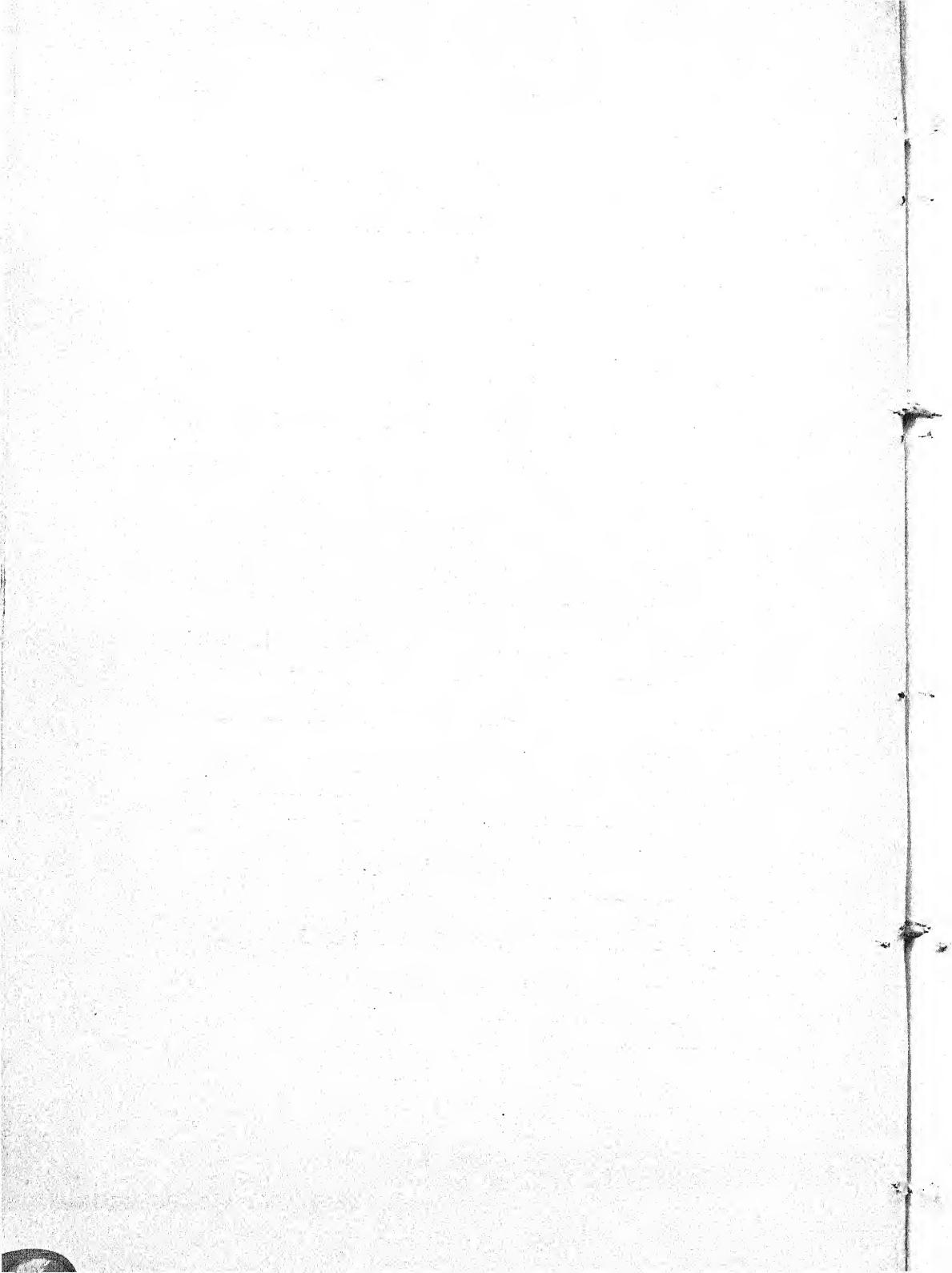
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I



II



III



IV



V



VI



VII



VIII



IX



X



XI



XII



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XV



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XIX



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XIX



XX

GOLD COINS FOUND IN THE AHIN POSH TOPE, JALALABAD.

(Reverses.)

B

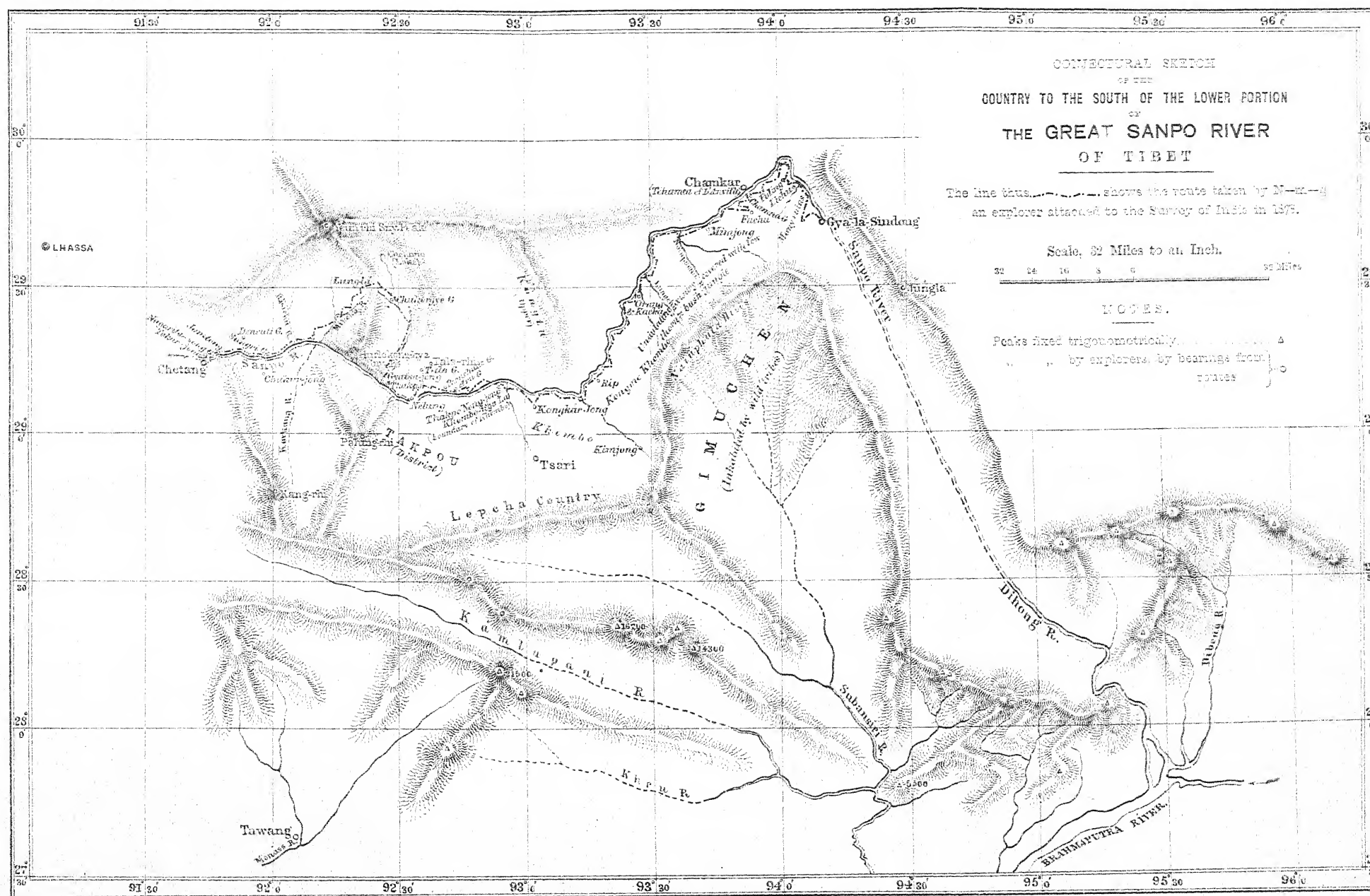
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A

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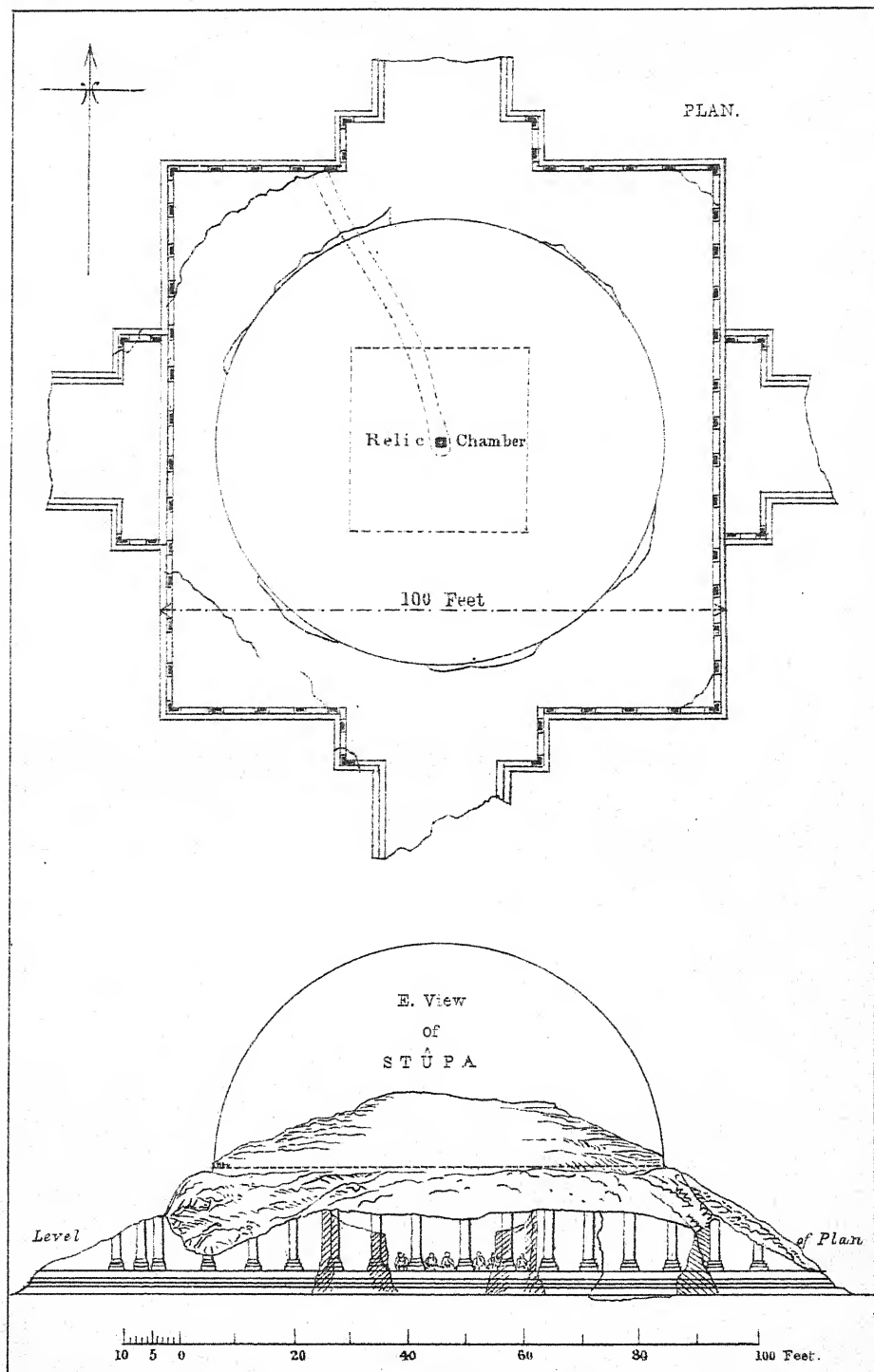
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Lithographed at the Surveyor General's Office, Calcutta, September 1879.







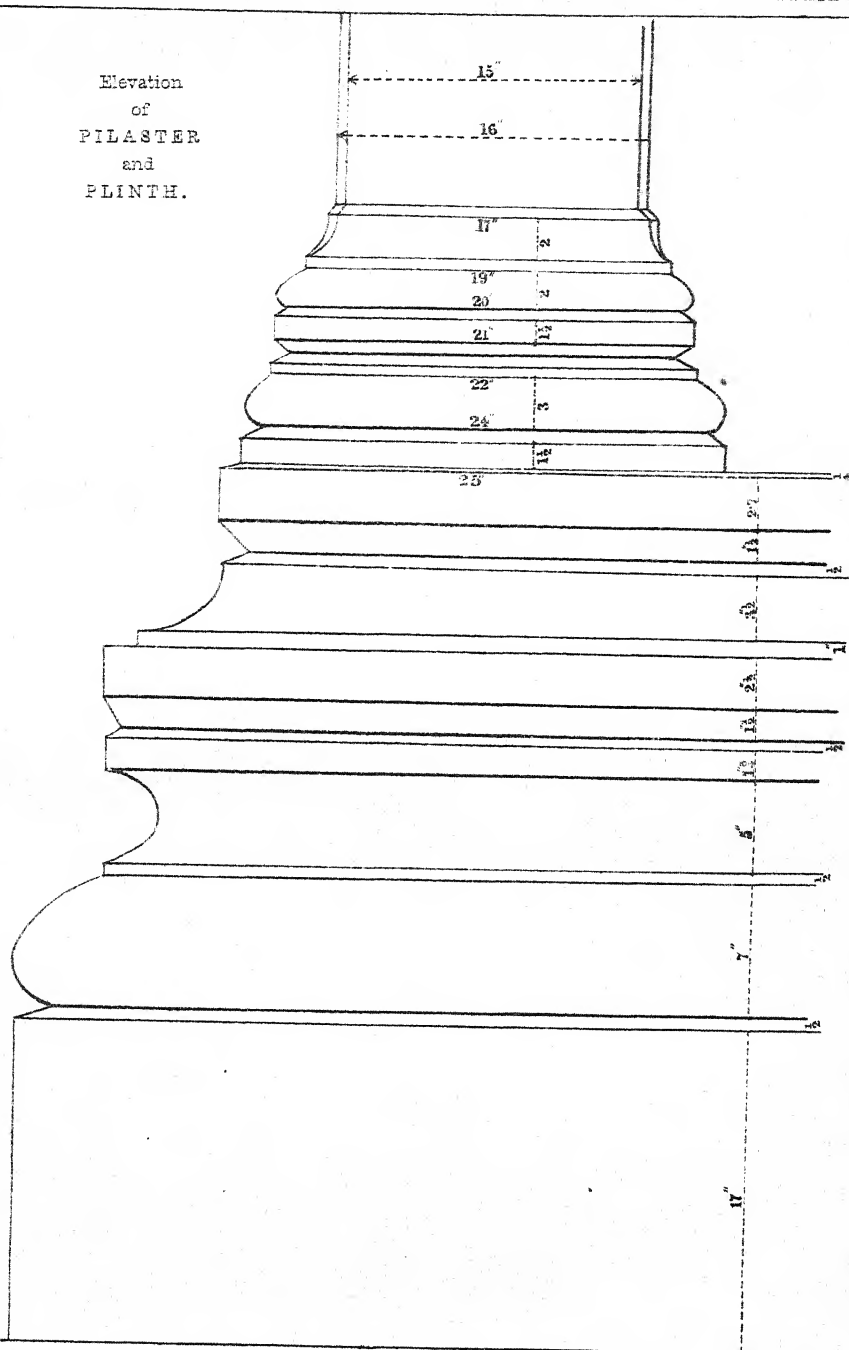


AHIN-POSH STÛPA.

Lithographed at the Surveyor General's Office, Calcutta, August 1879.



Elevation  
of  
PILASTER  
and  
PLINTH.

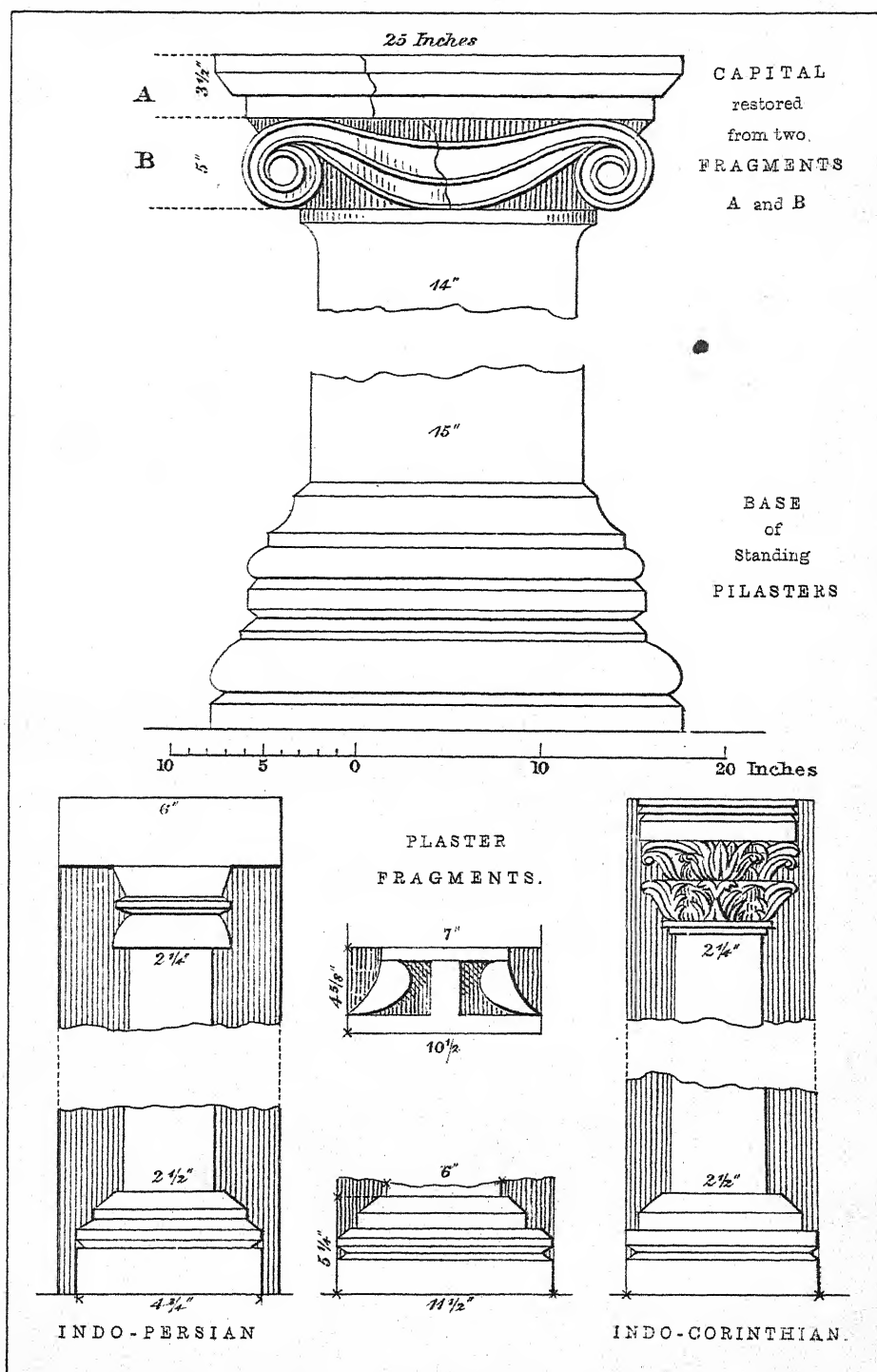


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A. Cunningham, del.

AHIN-POSH STÜPA.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR NOVEMBER, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 5th instant, at 9 o'clock P. M.

D. WALDIE, Esq., in the Chair.

The minutes of the last Meeting were read and confirmed.

The following presentations were announced—

1. From the Rev. C. H. A. Dall—"Scientific Results of the exploration of Alaska; Article IV. Report on the Limpets and Clitons of the Alaskan and Arctic Regions, by W. H. Dall."

2. From St. Xavier's College—"Observatory observations from January to June, 1879."

3. From the K. K. Akad. der Wissenschaften, München—"Ueber die Chemische Synthese," by Dr. A. Baeyer.

4. From the Director, Museo Publico de Buenos Aires—(1) "Description Physique de la République Argentine, Vol. V." by Dr. H. Burmeister. (2) "Atlas de la Description Physique de la République Argentine."

5. From the Magnetical and Meteorological Observatory at Batavia.—"Observations taken at the Observatory, Vols. II and III, from January 1869, to December, 1875."

6. From the Royal University of Norway—Several volumes of the publications of the University, the titles of which are given in the Library List.

7. From the Author—"The History of Travancore from the earliest times," by P. Shungoony Menon.

8. From the Superintendent Marine Surveys—(1) Approaches to Cutch Mandvi. (2) Bay of Bengal, Eastern Sheet.

9. From G. V. Juggarow's Observatory, Daba Gardens, Vizagapa-



tam—"Results of Meteorological Observations, 1878, with Appendices," by A. V. Nursingrow.

10. From the Home, Revenue and Agricultural Department—(1) "Gaur; its Ruins and Inscriptions," by J. H. Ravenshaw. (2) A set of Photographs of the Paintings at Ajanta. (3) 12 Coins from the Ahin Posh Tope. (4) "The Vinayapitakam," by Dr. H. Oldenberg.

11. From the Trustees, Indian Museum—Annual Report, Lists of Accessions and selected Extracts of Minutes, April 1878 to March 1879.

12. From the Royal Society of London—"Catalogue of Scientific Papers 1864-1873, Vol. VIII."

13. From the Palæographical Society—Facsimiles of Ancient MSS., Oriental Series, Part IV.

14. From the Smithsonian Institution—(1) "Annual Report of the Board of Regents of the Smithsonian Institution for 1877." (2) "Sketch of the Life and Contributions to Science of Professor Joseph Henry, LL. D."

15. From the Trustees, British Museum—"Illustrations of Typical Specimens of *Lepidoptera Heterocera* in the collection of the British Museum, Part II," by A. G. Butler.

16. From the Author—"Premier essai sur la Genèse du Langage et le mystère Antique," by P. L. F. Philastre.

17. From F. V. Hayden, Esq., U. S. Geologist—(1) "Tenth Annual Report of the U. S. Geological and Geographical Survey of the Territories for 1876." (2) "Birds of the Colorado valley," Part I, by E. Coues.

18. From the Commissioner of Agriculture, United States—"Report of the Commissioner of Agriculture for 1877."

19. From Mrs. Charles Pickering—"The Chronological History of Plants," by Dr. Charles Pickering.

20. From Sayyid Ahmed Khan, through Dr. R. Mitra, three copper coins of Nepaul.

21. From C. J. Rodgers, Esq., some Káshmir coins.

22. From the Author—Ethnological Papers, by Dr. F. Jagor.

23. From the Author—"Hindu Tribes and Castes," Vol. II, by the Rev. M. A. Sherring.

24. From the Government N. W. P.—"Gazetteer of the Province of Oudh." (2) "A Catalogue of Sanskrit MSS. in the North-West Provinces," Part IV.

The following gentleman, duly proposed and seconded at the Council Meeting in October, was ballotted for and elected an Ordinary Member—

Dr. T. E. Charles, proposed by C. H. Tawney, Esq., seconded by Dr. D. B. Smith.

The CHAIRMAN announced to the meeting that, in accordance with Rule 7, the following gentlemen had been ballotted for and elected Ordinary Members by the Council during the recess—

D. G. Barkley, Esq., M. A., B. C. S.

R. Maconochie, Esq., C. S.

Dr. C. F. Oldham, F. R. G. S.

W. D. Blyth, Esq., C. S.

R. A. Sterndale, Esq., (re-elected), proposed by Major J. Waterhouse, seconded by Dr. J. Anderson.

The following is a candidate for ballot at the next meeting—

G. S. Leonard, Esq., proposed by Dr. R. L. Mitra, seconded by Major J. Waterhouse.

The SECRETARY announced that the following gentlemen had intimated their desire to withdraw from the Society—

C. H. Wood, Esq.

Major W. L. Samuells, B. S. C.

I. J. Whitty, Esq.

E. White, Esq., C. S.

A. Wilson, Esq.

A. Smidt, Esq.

H. S. Reid, Esq., C. S.

W. Duthoit, Esq., C. S.

and that Mr. A. C. Lyall had requested that his re-election to the Society might be cancelled.

The SECRETARY reported that the following coins had been acquired under the Treasure Trove Act—

From the Deputy Commissioner of Hoshiarpur—6 silver and 2 copper coins found in the town of Anandpur.

From the Collector of the 24-Pergunnahs—6 silver early Hindu punched coins found in digging a tank at the village of Zakra.

From the Magistrate of Budaun—7 silver coins found in the district of Budaun.

From the Bombay Branch Royal Asiatic Society—A silver coin found in the district of Sattara.

The COUNCIL reported that Mr. T. S. Isaac had tendered his resignation as Trustee of the Indian Museum on behalf of the Society and as Member of the Council, and that Dr. A. F. R. Hoernle had been appointed Trustee, and Mr. J. Westland, C. S., Member of Council, in his place.

The SECRETARY reported that the following had been made over to the Indian Museum, under the provisions of Section 12, Act XXII of 1876 :

(1) 3 small figures ; one stone, one bronze, and one copper. (2) A celt found by Capt. Badgley at Shillong in 1873. (3) Geological and other specimens collected by Lieut. Temple during the march of the Tal Chotali Force between Kala Abdullah Khán and Lugári Barkhán.

The SECRETARY laid before the Meeting a copy of the 1st Part of Moore and Hewitson's Descriptions of New Indian *Lepidoptera*, lately received from England, and stated that the Council had conveyed the thanks of the Society to Mr. A. Grote and Mr. Moore for the care and trouble they had taken in bringing out the work and plates.

The following papers were read :—

1. *The Evidence afforded by the Indian Pendulum Observations on the Constitution of the Earth's Crust and on Geodesy ; being an Extract from the Preface to Vol. V of the Account of the Operations of the Great Trigonometrical Survey.*—By MAJOR-GENERAL J. T. WALKER, R. E., C. B., F. R. S., &c.

The Great Meridional Arc in India, which was measured by Colonels Lambton and Everest, was long regarded as one of the most important of the several arcs which had been measured in various countries for the determination of the Figure of the Earth. But a paper by Archdeacon Pratt, which was published in the *Philosophical Transactions of the Royal Society* for 1854, shewed that the astronomical determinations of the latitudes of the stations of the Indian Arc might be very materially influenced by deflections of the plumb-line, caused by the attraction of the Himalayan Mountains, and the high Table-lands included between the mountains, and extending beyond them into Tibet. Thus a short time after the publication of this paper, Colonel Clarke, of the Ordnance Survey, while making the elaborate and very valuable investigation of the Figure of the Earth which is appended to the *Account of the Principal Triangulation of the Ordnance Survey of Great Britain and Ireland*, London, 1858, was driven to the conclusion—which is expressed in the last page of the volume—that the value of the Indian Arc had been considerably diminished since the investigations of Archdeacon Pratt.

But the several Sections of the Arc, though showing some indication of having been influenced by Himalayan attraction, did not appear to have been influenced to anything like the extent to which they should have been, considering the magnitudes of the attracting masses. Thus it was suggested, by Mr.—now Sir G. B.—Airy, that the disturbing forces must be counteracted by some compensatory disposition of the matter in the in-

terior of the earth's crust, immediately below the mountain masses. In this case pendulum observations, taken at stations on the Himalayas, and probably also on the table-lands of much lower elevation which are situated between those mountains and the sea, would show more or less diminution in the vertical force of gravity at each station (reduced to the sea-level) as compared with what would be found at stations actually situated on the sea-level. It was in order to throw light on this subject that the pendulums were employed in India, at a series of consecutive stations along the axis of the Peninsula, from Cape Comorin up to and then on the Himalayan masses, as well as at points on the coast and on islands contiguous thereto.

On making a comparison of the observed with the calculated results, we find a considerable diminution in the vibration-numbers of the pendulums—that is to say, in the force of gravity—at the Himalayan and the higher Continental stations, relatively to what is met with at the Coast and the Island stations. We may not, however, attribute this deficiency of gravity wholly to local causes, because Sir George Airy has already pointed out—many years ago, in his discussion of pendulum observations, see the *Encyclopædia Metropolitana*, Art. FIGURE OF THE EARTH—that gravity appears to be greater at oceanic stations than at continental stations, on the evidence of the vibration-numbers of pendulums which had been swung at several stations in various parts of the world, on the coasts and islands of the Atlantic and Pacific, as well as on the continents of Europe and America. Subsequently, in 1849, Professor Stokes showed\* that these differences between observation and theory might be due to a general raising of the level of the sea in the vicinity of continents, over the level at oceanic islands, because of the greater density of the continent than of the ocean. He proved that “if we set a circle of land  $\frac{1}{4}$ th of a mile high, of 1000 “miles radius, surrounding one station, against a circle of sea 3·5 miles “deep, surrounding another station, we get a difference of about 3·5, nearly, in the number of vibrations performed in one day by a seconds pendulum.” The principal part of this correction is, however, due to the depth of sea. “Thus it would require a uniform elevation of about 2·1 miles, in “order that the land elevated above the level of the sea should produce as “much effect as is produced by the difference between a stratum of land “3·5 miles thick and an equal stratum of water.”

It is clear from Professor Stokes's investigations that whenever the results of the pendulum observations in India came to be compared with those of pendulum observations at distant oceanic stations, it was to be expected that the observed vibration-numbers might be found to be gener-

\* See his paper on the Variation of Gravity at the Surface of the Earth, in the *Transactions of the Cambridge Philosophical Society*. Volume VIII, Part V.

ally in defect, as compared with the theoretical numbers, at the Indian stations, and in excess at the Oceanic. This is what Major Herschel believes he has met with, in his preliminary investigations of the relations between the pendulum observations in India and those in other parts of the world. And it explains why in his comparison of observed with calculated results, he has referred the Indian results to the equator—instead of to the southernmost Indian station, Punnae, as formerly—and has adopted, as a provisional basis for conversion, a mean equatorial vibration-number which he has derived from other observations than those of the Indian group.

The alteration of treatment affects the vibration-numbers throughout by a constant, the magnitude of which, however, is only 2.65 vibrations. We must look therefore to local rather than to distant causes for an explanation of the magnitudes of the deficiency of gravity which are met with.

To make this more clear it is desirable to refer the observations once more to Punnae, instead of to the equator. Then, ranging the stations in order of altitude—from the ocean to the coast line and on to the interior of the continent, and finally up to the Himalayas—we have the following apparent variations, at all the stations but Kew, which is so far to the north of the others that it can only be compared with them on the supposition that the value of the ellipticity employed in the calculation is very exact.

#### APPARENT VARIATIONS.

<i>Island Stations.</i>		<i>Inland Stations less than 2000 feet, mean 1210.</i>		<i>Inland Stations between 2000 and 7000 feet, mean 3822.</i>	
Minicoy	+ 4.02				
Colába	+ 3.40	Mallapatti	— 1.12	Bangalore, South	— 3.28
Aden	+ 2.34	Pachapaliam	— 1.76	„ North	— 2.79
		Namthábad	— 2.89	Dehra	— 8.71
Mean	+ 3.25	Kodangal	— 1.94	Mussoorie	— 5.57
		Damargída	— 3.91		
		Somtána	— 1.66	Mean	— 5.09
<i>Coast Stations.</i>		Badgaon	— 1.38		
Punnæ	0.00	Ahmadpúr	— 1.73		
Kúdankolam	+ 0.09	Kaliánpúr	— 0.96		
Alleppy	+ 1.44	Pahárgarh	— 2.95	<i>Himalayan Table-land</i>	
Mangalore	— 0.59	Usira	— 0.95	<i>Station 15,400 feet high.</i>	
Madras	— 0.74	Datairi	— 1.65		
Cocanáda	+ 0.84	Kaliána	— 3.49	Moré	— 21.44
Calcutta	+ 1.38	Nojli	— 4.23		
Ismailia	— 0.48	Meean Meer	— 3.36		
		Mean	— 2.27		
Mean	+ 0.24				

These figures show a comparative excess of gravity at the Island stations which is equivalent to 3.25 vibrations of a seconds pendulum, and which diminishes to an excess of 0.24 at the Coast stations, and becomes a defect of 2.27 at Inland stations under 2000 feet in height, of 5.09 at Inland stations between 2000 and 7000 feet, and of 21.44 at Moré, where the height is 15,400 feet. It will be found that the ratios of the mean defects of the vibration-numbers to the average heights of the elevated masses, as exhibited at the two groups of Inland stations and at Moré, are very fairly accordant, a change of one vibration accompanying changes of height of 533, 751 and 718 feet respectively. And if we multiply the mean of these values by 3.25—the mean excess at the three Island stations—we get 2,168 feet, which probably does not differ very materially from the mean depression of the circumjacent ocean-bed below the level of the islands. Thus the amount of elevation above or depression below the actual sea-level has obviously a very important bearing on the discrepancies between theory and observation.

Now it is to be remembered that the vibration-numbers at the Island and Coast stations have not, in a single instance, been increased for the deficiency of density of the sea as compared with the land; because satisfactory data of the surrounding sea-depths were not available. It will, however, be obvious that in order to institute a fair comparison between the force of gravity at these and at the inland stations, the vibration-numbers at the coast stations should be somewhat augmented, and those at the island stations should be augmented in a still greater degree, on this account. Moreover the vibration-numbers at the higher inland stations should also be increased, not on account of the density of the sea, but because the observations have been reduced to the apparent sea-level, which is presumably raised above the normal sea-level by the attraction of the continental masses. The extreme increase would be at Minicoy Island, for deficient density, on the one hand, and at Moré, for elevation, on the other. For Minicoy we may take the increase as from 3 to 4 vibrations. For Moré, if we assume the apparent sea-level to have been raised 1000 feet by Himalayan attraction,\* we get an increase for height and mass of 2 to 3 vibra-

\* In the 4th edition of his *Figure of the Earth* (1871), Archdeacon Pratt shows (Arts. 200 and 201) that if  $z$  is the height through which the sea-level immediately below a station on a table-land is raised by attraction,  $h$  the height of the table-land,  $d$  the length of the mean horizontal diameter of the table-land through the station, and  $c$  the earth's radius, then

$$z = \frac{3}{8c} \frac{hd}{c}, \text{ approximately,}$$

and taking  $h = 15,500$  feet,  $d = 670$  miles and  $c = 3,956$  miles  
he gets  $z = 985$  feet.

tions, by Dr. Young's rule. Thus the ratio of gravity at the extreme stations of Minicoy and Moré would not be very sensibly altered from what the given vibration-numbers indicate; but the increase in the vibration-number would gradually diminish in passing from either of the two extreme stations to any intermediate inland station, which is situated too far from the sea to be influenced by its density, and on land too low to raise the sea-level sensibly; consequently the ratio of gravity at the central as compared with the extreme stations may be very sensibly affected, that is to say by the amount due to an alteration of 2 to 4 vibrations at one or other of a pair of stations under comparison.

Still, however, making every allowance for these causes, the broad fact remains that the observations at the Indian pendulum stations exhibit a marked increase of gravity, when we proceed from the interior of the continent to the coast and then to the islands of the ocean; and they also indicate a very marked decrease, when we proceed towards and ascend the high table-lands of the Himalayas. These facts point to a condensation of the matter of the earth's crust under ocean-beds, and an attenuation of the matter under mountain-beds, the crust contracting and condensing wherever it sank into hollows, and expanding and attenuating wherever it rose into continents, as has been suggested by Archdeacon Pratt.

This seems a fitting place for giving a brief sketch of the Archdeacon's labours and investigations, on the subject of the effects of Himalayan Attraction upon the Geodetic Operations of the Great Trigonometrical Survey of India.

The question was first brought to his attention, in 1852, by the then Surveyor General, Sir Andrew Waugh. Discrepancies of  $5''.2$  and  $3''.8$  respectively had been met with between the computed and observed amplitudes, in the two northernmost sections of the Great Arc, Damargída-Kaliánpúr-Kaliána, the observed value being in defect in the northern and in excess in the southern section. They were supposed to be due to the influence of the great mountain range to the north, though distant fully sixty miles from Kaliána, the nearest of the three stations. Archdeacon Pratt set himself to calculate the actual amount of the attraction of the Himalayan mass, and of the deflection on the plumb-line which it would cause at the three stations. The result obtained was very much larger than had been expected, or than was required to explain the differences between the astronomical and the geodetic amplitudes. The Archdeacon's calculations were communicated to the Royal Society, in the paper already alluded to which was published in the *Philosophical Transactions* for 1854. This paper is followed by one by G. B. Airy, Esq., Astronomer Royal, suggest-



ing that the effect of the mountains may be counteracted by their bases having sunk to some depth into the dense fluid lava below, on the surface of which the crust may usually be supposed to repose; such sinking would cause a displacement of dense by lighter matter below, which would tend to compensate for the excess of matter above. While demurring to the form of this suggestion, Archdeacon Pratt followed up the idea, and reduced to calculation another hypothesis regarding deficiency of matter below mountains, *viz.*, that the irregularities of the mountain surface have arisen from the expansion of the earth's crust upwards, from depths below, which has upheaved the mountains and produced a slight but extensive attenuation of the mass below them. This attenuation he shows to be sufficient to produce a considerable amount of compensation for mountain attraction; but he states that it does not clear up the difficulties; and, being a mere hypothesis, nothing certain could be determined regarding it; see No. XXIX of *Philosophical Transactions* for 1858. Subsequently he investigated the influence of the Ocean on the plumb-line in India, and found that it also had a very sensible effect at the stations of the Arc, and in the same direction as the Himalayan Attraction (No. XXX, *Philosophical Transactions*, 1858).

Hitherto the Archdeacon had been inclined to attribute the calculated deflections of the plumb-line, in some degree, to errors in the elements of the figure of the earth which had been employed in the geodetic computations. But in 1860 he satisfied himself that this was not the case, and that there *are* hidden causes,—in variation of density in the crust below the Indian Arc—which, taken in combination with the Mountain and Ocean Attraction, explain the smallness of the discrepancies that had been met with, (No. XXXIV, *Philosophical Transactions*, 1861).

Thus far his attention had been directed only to horizontal attractions, producing, and measured by, deflections of the plumb-line. When the Indian pendulum operations were commenced, he watched their progress with great interest, to see whether their direct measures of vertical attraction supported his views regarding attenuation of matter below mountains. The results of his calculations are given in his *Figure of the Earth*, 4th edition, 1871. He shows, in Art. 196, that the discrepancies between theory and observation become considerably reduced when it is assumed that beneath any portion or cap of the earth's crust, which is raised above the sea-level, there is a uniform attenuation of matter equal to that of the cap, running down to a depth from fifty to one hundred times the thickness of the cap. This result was arrived at when as yet he had only been furnished with the evidence of the stations between Minicoy and Kaliána, the highest of which is only about 3000 feet above the sea-level. Subsequent-

ly, while passing the proof-sheets of the volume through the press, he learnt the result of Captain Basevi's observations at Moré; he then made a calculation which showed that an assumed attenuation of matter equal to that of the Moré plateau, and extending to a depth equal to fifty times the height of the plateau, would, if taken account of in the reductions, leave so small a difference between theory and observation as to bear strong testimony to the truth of his hypothesis, see Art. 201.

Archdeacon Pratt died before this edition of his *Figure of the Earth* was published. His views have since received further confirmation by the measurement of two longitudinal arcs across the Southern Peninsula of India, from Madras to Mangalore, and from Vizagapatam to Bombay. The terminal stations of these arcs being situated on the coast line, in each instance, it was probable that at each station the plumb-line would be deflected inland, because of the greater attraction of the land than the sea, in which case the astronomical amplitudes would have been greater than the geodetic. Actually, however, the converse was found to have happened, for the astronomical amplitudes proved to be less than the geodetic; this showed that the plumb-line had been deflected towards the sea, presumably because of denser matter under the bed of the ocean than under the land.

An additional support to the Archdeacon's hypothesis has been recently furnished by an interesting calculation in Colonel Clarke's latest investigation of the Figure of the Earth, published in the *Philosophical Magazine* for August, 1878. Colonel Clarke has computed the departure (in a vertical plane) of the curve which best represents the Indian meridian, on the evidence of the geodetic observations in India, from the curve which best represents the earth as a whole, on the evidence of the geodetic observations in all other parts of the world as well as India. He shows that the curves cross each other, and that their departure in no case exceeds 20 feet; and he says—"This deformation may or may not be due to Himalayan attraction; at any rate we have here an indication that that vast table-land does not produce the disturbance that might *à priori* have been anticipated. This is in accordance with the fact that there is an attraction *sea-wards* at Mangalore and Madras, and slightly also at Bombay: and I think we have here a corroboration of Archdeacon Pratt's theory, that where the crust of the earth is thickest there it is least dense; and where thinnest, as in ocean-beds, there it is most dense."

If the hypothesis of sub-continental attenuation and sub-oceanic condensation is a true one, and is in accordance with the actual facts of the constitution of the earth's crust, then it follows that there can be no very

considerable disturbance of the sea-level, so that all radii drawn from the centre of the earth to the surface of the ocean will be sensibly equal—assuming the figure to be exactly spherical in order to avoid circumlocution; it also follows that deflections of the plumb-line are not likely to be very considerable, excepting in the immediate vicinity of mountain masses, where the deficiency below cannot neutralise the excess above. If so, then distant mountain masses may cease to be regarded as prejudicial to geodetic operations, for their influence will be sufficiently counteracted by other causes; the resultant effect at a distance may even be materially less than that of local and contiguous irregularities in the configuration of the ground, the magnitudes of which may be insignificant as compared with those of the mountain and continental masses. In like manner the deficiency of ocean-density need not be regarded as liable to influence distant geodetic operations, as it may be expected to be neutralised by an increase of density in the crust below the ocean-bed.

On the other hand, if the hypothesis is not correct, we are driven to conclude that the radii of the (spherical) earth are of unequal length, and that there must be considerable variations between the apparent level of the sea and the normal level which corresponds to the curve of equal radii. In this case the actual irregularities of the surface of the earth will be much greater than they appear to be, and the greater will be the departure of the Actual Figure from a simple geometrical figure, such as the Mean Figure—either a spheroid of two axes, or a triaxial ellipsoid—which geodesists deduce from their measurements over the earth's surface.

This latter view of the subject has found a warm advocate in Germany, in the person of Dr. J. Hann, who urges—in a paper published in Vienna, in the *Mittheilungen der Geographische Gesellschaft*, 1875, No. 12,—that the sea-level is greatly distorted, because of the unequal distribution of matter on the earth's surface; consequently, that we can no longer hope that geodetic measurements, reduced to a sea-level thus distorted, will conform to a regular ellipsoid of revolution; that our knowledge of the true form of the earth is deficient; and that it has become desirable to resort to pendulum operations, in order to determine the variation of gravity—as against some normal station—at as many oceanic islands as possible, and also at numerous stations on the coasts and in the interior of the great continents, in order to discover, by the shortest method, the irregularities of the sea-level.

Measurements of the variations of gravity have, unquestionably, one great advantage over measurements of meridional and longitudinal arcs, in that they can be conducted with far greater rapidity and at a far smaller cost. But they are open to a grave objection, in that when reducing them

to the sea-level, in order to obtain results from observations at different stations which will be strictly comparable with each other, it is necessarily assumed that the matter of the whole of that portion of the earth's crust which lies *directly* below the sea-level—and which, from its proximity, materially influences the attraction at the sea-level—is of uniform density throughout, in all parts of the world, whether situated underneath mountains and continents, or underneath the bed of the ocean. On this hypothesis all pendulum observations have hitherto been reduced to a common level, and it is none the less an hypothesis that it has been made tacitly. It implies that the matter of the visible masses above the sea-level is wholly unconnected with, and independent of, the matter of the invisible masses below; thus the mountains and continents might consist of just so much stuff thrown off passing meteors and asteroids—having a density  $\sigma = \frac{1}{2} \rho$  the mean density of the earth,—instead of being a continuation, or an expansion, of the matter immediately below them, which is the more natural supposition. That there actually is any such severance of continuity and disconnection between the visible above and the invisible below, appears, on the face of it, to be highly improbable.

Seeing then that, do what we will, we must make some assumption, I cannot but think that Archdeacon Pratt's hypothesis that the visible masses above may be regarded as so much matter abstracted from the invisible masses below, is the least difficult of the two hypotheses to accept. And if we proceed to consider the constitution of the crust below the bed of the ocean, it appears to me to be easier to assume, with the Archdeacon, that there the matter has been condensed down to a depth which bears some relation to the depth of the ocean above, than to assume it to be of the same density as the comparatively uncontracted matter at the level of the sea, on the coast lines.

Data are available for estimating, with tolerable approximation, the relative magnitudes of the greatest horizontal attraction exerted by the Himalayas and the greatest vertical diminution of attraction under the Himalayas, that is to say, of the two forces by which the geodetic and the pendulum operations, in India, are respectively most influenced. The latitude of one of the trigonometrical stations in Dehra Dún—beyond the northern extremity of the Great Arc—has been determined, both astronomically, and by calculation through the triangulation from Kaliánpúr, the astronomical origin of latitudes, 428 miles to the south. Dehra Dún being at the foot of the Himalayas, a large deflection of the plumb-line must be expected there, and, in fact, a larger meridional deflection has been met with there, than at any other station of the Survey at which astronomical observations have been taken. The astronomical latitude at Dehra is  $37^{\circ}6'$  in defect of

the geodetic latitude, computed, from Kaliánpúr, with the constants for the figure of the earth which are employed in all the geodetic calculations of this Survey; the difference would be diminished by  $1''.4$ , if Colonel Clarke's constants of 1866 had been employed instead. The astronomical azimuth at Dehra is  $12''.2$  in defect of the geodetic azimuth, also computed from Kaliánpúr; consequently, as the latitude is  $30^\circ 19' 57''$ , the deflection on the prime vertical—being equal to the azimuthal error  $\times$  the cotangent of the latitude—may be taken as  $20''.8$ . The resultant of the two deflections is  $43''$ ; it may be either increased or diminished by the local attraction at Kaliánpúr, which, however, is almost certainly not large. Assume the total deflection to be  $43''$ ; then the horizontal attraction which would produce a deflection to that extent is equal to gravity  $\times$  tangent of the deflection =  $.0002 g$ . Now we have seen that at Moré the deficiency of vertical attraction diminishes the number of vibrations of a seconds pendulum by about 21 vibrations *per diem*; and this deficiency of force is equivalent to  $.0005 g$ . Hence it appears that the variations of attraction which arise from hidden causes, below the Himalayan Mountains, may be from two to three times as great as those which arise from the mountains themselves; this being the proportion of the maximum vertical deficiency which has yet been met with, to the maximum horizontal attraction which has yet been met with.

Thus the Pendulum Observations in India have furnished much evidence in confirmation of the accuracy of the Geodetic Operations in India, tending to show that the latter have not been influenced, either by the positive attraction of the Himalayas, or by the negative attraction of the Ocean, to anything like the extent which each disturbing element, acting alone, would produce, were it not neutralised by the interior constitution of the subjacent matter.

It would seem that measures of variations of gravity on the earth's surface can never be made to supersede direct measures of the earth's figure. Each process is supplemental to the other; for all determinations of variations of gravity, in widely separated localities, necessarily rest on an exact knowledge of the figure; and a knowledge of the variations of gravity gives greater exactitude to the determination of the figure. Thus there is no necessity to divorce the two processes, and to relegate either the one or the other into obscurity; on the contrary, the simultaneous employment of both, whenever practicable, appears to be most desirable, in the general interests of Science.

2. *On a simple method of using an insignificant Fraction of the Main Current, produced by a Dynamo-Electric Machine for Telegraph purposes.*—By LOUIS SCHWENDLER, M. I. C. E. &c., &c.

(Abstract.)

The author pointed out that up to the present the electric currents required for Telegraph signalling were chiefly produced by galvanic Batteries, a method comparatively expensive and also connected with cumbersome arrangements. Since his Electric light experiments, instituted last year in London by order of the Secretary of State for India, he had always been of opinion that it would be of technical as well as of economical importance if the strong, constant and exceedingly cheap currents, produced by the present construction of Dynamo-Electric machines, could be made available for signalling purposes. However Mr. Schwendler found at the time, that there were some difficulties in the way, which he believed he had now overcome; and having of late made some experiments on the subject, he did not hesitate to communicate the results. His method is a very simple and ingenious one. A strong current is produced through a comparatively small resistance by a Dynamo-Electric machine, which is an arrangement for converting *Mechanical Power* direct into *Magnetism* and *Electricity* according to the well known laws of Faraday's Magneto-Induction. This strong main current, so produced, is made use of for doing any kind of *useful work*. For instance, during night the useful work done by the main current may be given out as a powerful Electric Light to illuminate the signalling office; or during day-time the strong main current may be employed to drive an Electro-Magnetic Engine which, in its turn, is used for doing any kind of useful mechanical work, as pulling the punkhas, producing a draft of refreshing cool air through the building, lifting messages, &c. &c.; or the main current may be sent through a large galvanoplastic apparatus in use, say, at the Surveyor General's Office &c., &c. Thus a strong electric current becomes available, the production of which is wholly or partly repaid by the useful work it is able to execute in a variety of ways as indicated.

On the other hand the electric currents required for signalling purposes are exceedingly weak as compared with the strong main current. Hence the Electric currents may be supplied to the Telegraph lines, by simply tapping the main current without perceptibly reducing it, or without influencing the useful work done by the main current. This is the method Mr. Schwendler proposes. He said: "This might be an inducement for Telegraph administrations to come forward more quickly with the introduction of the Electric Light in their Signalling offices, since they would



get the signalling currents for all the lines terminating in an office into the bargain, and the costly and cumbersome galvanic apparatus might be dispensed with."

On the 14th October, 1879, Mr. Schwendler telegraphed by this method to Agra. The main current was produced at the Alipore Government Telegraph Workshops, and the useful work consisted of a powerful Electric Light, illuminating the Workshops perfectly. An ordinary Telegraph line conveyed the branch current to the Calcutta Signalling Office, where it was joined to the Agra line (850 miles in length); and several messages were despatched by the use of this current. No alteration of the electric light could be observed when telegraphing; and this, of course, is quite right, since the signalling current tapped off was scarcely 0·04 per cent. of the main current producing the light.

Other experiments equally successful were made. In fact, feeding in this manner all the 14 lines which terminate at the Calcutta Office, scarcely more than 5·0 per cent. of the total main current is required.

Mr. Schwendler concluded by saying that there was little doubt left that, at no distant future, Telegraph lines would be supplied with currents produced by Dynamo-Electric machines instead of using galvanic currents as hitherto.

The paper will be published in full in the Journal, Part II.

3. *Notes on the Survey Operations in Afghanistan during the Campaign of 1878-79; compiled, from Letters and Diaries of the Survey Officers, by MAJOR J. WATERHOUSE. Communicated by MAJOR-GENL. J. T. WALKER, R. E., C. B., F. R. S.*

(Abstract.)

This paper gives an account of the work performed by the Survey parties attached to the Quetta, Kuram and Pesháwar Columns of the Afghan Expeditionary Force in 1878-79, and will be published, with a map, in the forthcoming number of Part II of the Journal.

4. *On the Systematic Position of some little-known Asiatic Mantodea, with Descriptions of two new Species belonging to the Genus Hestias. By J. WOOD-MASON.*

(Abstract.)

Genus *HESTIAS*, Saussure.

The genus *Hestias*, proposed in 1871 by De Saussure for the reception of a remarkable insect from Sylhet, is referred to the subfamily *Harpagidae*, wherein it must take its place next after, or in the immediate neighbourhood of, *Aeromantis* and its allies, from which it is readily distin-



guishable by the form of the prothorax, by the structure, and by the peculiar style of colouring of the insides, of the fore legs, &c. The author recognises five species, of which two are now for the first time described, viz. :—

1. *HESTIAS BRUNNERIANA*, Saussure, Mém. Orthopt. i, 1871, 3me fasc., p. 454, ♀.—Wood-Mason, P. A. S. B. August 1876, ♂ ♀.

*Hab.* Sylhet and Calcutta in N. India and Mysore in S. India.

2. *HESTIAS ROGENHOFERI*.

*Pachymantis Rogenhoferi*, Saussure, Mém. Orthopt. ii, 1872, p. 77, pl. ix, fig. 27 ♀.

*Hab.* Moluccas?

3. *HESTIAS PICTIPES*, n. sp.

♂ ♀. Head with a minute horn shaped like that of *H. Brunneriana*.  
♂. Organs of flight ♀ not reaching, ♂ extending beyond, extremity of abdomen. Tegmina ♀ with the marginal field opaque light yellowish green, the rest delicately hyaline; wings with marginal field subopaque orange-yellow, the venation of the rest of the organ of the same colour narrowly lined with hyaline, and the meshes pale smoky. Fore coxae red-violet especially internally, femora inside on the lower half jet-black with three distinct white spots in a longitudinal row, and with a narrow black stripe extending from the base along fully three-fourths of the length of the margin of the foliaceous expansion, the rest of the surface being rich red-violet.

Length ♀ about 19 millims, ♂ 17.

The specimen of the male is somewhat bleached from long residence in spirit.

*Hab.* ♀ Marble Rocks, near Jabalpur in the Central Provinces of India; ♂, precise locality unknown.

4. *HESTIAS INERMIS*, n. sp.

♀. Head without a vestige of a horn, with the postocular tubercles by correlation reduced to low smooth and rounded elevations; behind the ocelli longitudinally deeply 4-sulcate. Organs of flight not reaching extremity of body; tegmina with the light opaque umber-brown marginal field pubescent; and with the posterior field rich dark umber-brown mottled in places with lighter and with hyaline, and crossed beyond the middle by a band half hyaline and half opaque cream-coloured; wings opaque lemon-yellow very broadly margined with dark brown, with the transverse veinlets lined with hyaline.

Fore coxae jet-black inside, femora jet-black at base, whence this colour is continued for some distance as a marginal band on to the foliaceous expansion.

Length about 34 millims.

*Hab.* Nágá Hills (Captain J. Butler). Very nearly allied to the following.

5. *HESTIAS PHYLLOPUS*.

*Mantis (Oxypilus) phyllopus*, De Haan, Bijd. etc., p. 84, pl. XVI, fig. 7, ♂.

The fore femora ♂ ♀ have two black stripes in the lower half (primitive femur).

The author has seen a specimen of the female either at Oxford or in the British Museum.

*Hab.* Java.

Genus *OXYPILOTUS*, Serville.

The author considers that this genus should be transferred from the *Mantidae* to the *Harpagidae* and therein placed between the genera *Hestias* and *Sigerpes*. *Ceratomantis Saussurii*, W.-M., and *Mantis (Oxypilus) bicingulata*, De Haan, are shown to be closely allied Asiatic species of it, having the same relation to one another, as regards degree of development of the cephalic horn, as have *Hestias Brunneriana* and *Hestias pictipes*. *Oxypilus* has in common with *Sigerpes* the two posterior ocelli placed at the bases of spines. The author has only been able to study immature specimens of one African species, and if the perfect winged insects of these should hereafter be found to differ sufficiently from those of the Asiatic species to warrant their separation from them generically, the latter must take the name of *Pachymantis* proposed for the reception of De Haan's *Mantis bicingulata* by De Saussure.

This paper will be published in *extenso* in the Journal, Part II, No. 4, for the current year, with figures of anatomical details.

5. *Description of Sigerpes occidentalis, the Type of a new Genus of Mantodea from West Africa.*—By J. WOOD-MASON.  
(Abstract.)

In this short paper a new species of *Mantodea* closely related to the East African *Sibylla tridens*, Saussure, is described and made the type of a new genus, *Sigerpes*, which must be placed in the subfamily *Harpagidae* next to the genera *Oxypilus* and *Hestias*.

The cephalic horn, as was suspected by the author (P. A. S. B., 1876), turns out to be rudimentary in the males.

The new species, described from a fine dried ♀ specimen in the British Museum from the neighbourhood of Sierra Leone, differs from *Sigerpes* (olim *Sibylla*) *tridens* ♀ in having the cephalic horn somewhat longer and without lateral lobes and teeth, the base of the wings greenish yellow, the fore tibiae more numerously toothed, the fore femora on the inside red tipped with black, and the extremities of the organs of flight not so obviously truncate.

This paper will be published in the Journal, Part II, No. 4, for 1879.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in August last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies or Editors.

- Batavia. *Natuurkundig Tijdschrift voor Nederlandsch - Indië*,—Deel XXXVIII.
- . *Genootschap van Kunsten en Wetenschappen*,—Notulen, Vols. I to VIII, XIII to XVI and XVII, No. 1.
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- May. *Rammelsberg*.—Ueber die Fortschritte in der Kenntniss der chemischen Natur der Meteoriten.
- June. *Weber*.—Ueber die Magavyakti des Krishnadāsa Miṣra.
- Bombay. *Indian Antiquary*,—Vol. VIII, Parts 96, 97 and 98.
- No. 96. *Williams, Monier*.—Notes on Indian Folklore &c. *Fleet, J. F.*—Sanskrit and old Canarese Inscriptions, No. 54. *Cain, Rev. John*.—The Bhadrachellam and Rekapalli Taluqas. *Müller, Dr. E.*—Report on the Inscriptions in the Hambantota District, Ceylon. *Simpson, W.*—Buddhist Remains in the Jalālābād Valley.
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———. Revue des deux Mondes,—Vols. XXXIII, No. 4; XXXIV, Nos. 1—4; XXXV, Nos. 1—3.

———. Revue Scientifique,—Vol. XVII, Nos. 3—15.

No. 5. La Chine dans l'Asie Centrale.

No. 14. Les Anglais dans l'Afghanistan.

No. 15. *Imbs, J.*—La Soie, ses dérivés, ses similaires.



Paris. *Journal des Savants*,—July, August and September 1879.

Roorkee. Professional Papers on Indian Engineering,—Nos. 9, 19, 20 and 22.

### BOOKS PURCHASED.

BALFOUR, E. *Cyclopædia of India and of Eastern and Southern Asia*. Second Edition, 5 Vols. 8vo., Madras, 1871.

CANDOLLE, A. DE. *Lois de nomenclature botanique*. 8vo., Geneva, 1867.

DENNIS, G. *The Cities and Cemeteries of Etruria*. Map, Plans and Illustrations. 2 Vols. 8vo., London, 1878.

DOWSON, J. *A Classical Dictionary of Hindu Mythology and Religion, Geography, History and Literature*. 8vo., London, 1879.

FAUSBOLL, V. *The Jataka, together with its Commentary*. Translated by T. W. Rhys Davids. Vol. II, Text. 8vo., London, 1879.

GOULD, J. *The Birds of Asia, Part XXXI*. Fol., London, 1879.

———. *The Birds of New Guinea and the Adjacent Papuan Islands, Part X*. Fol., London, 1879.

HUME, A. O. and MARSHALL, C. H. T. *The Game-Birds of India, Burmah and Ceylon*. Vol. I. Royal 8vo., Calcutta, 1879.

*Parliamentary Papers*. Further Papers relating to the Affairs of Afghanistan. Fep., London, 1878.

QUATREFAGES, A. DE. *The Human Species*. Sm. 8vo., London, 1879.

ROOD, O. N. *Modern Chromatics, with Applications to Art and Industry*. Sm. 8vo., London, 1879.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR DECEMBER, 1879.

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The monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 3rd instant, at 9 o'clock P. M.

H. B. MEDLICOTT, Esq., M. A., F. R. S., President, in the Chair.

The minutes of the last Meeting were read and confirmed:—

The following presentations were announced—

1. From the Home, Revenue and Agricultural Department,—(1) The Fishes of India, Vol. II, by F. Day; (2) Scientific Results of the Second Yarkand Expedition. *Mammalia*, by W. T. Blanford.

2. From the Author,—(1) On the connection of the Mōns of Pegu with the Kōles of Central India; and (2) On Tibeto-Burman Languages, by Captain C. J. F. Forbes.

3. From the K. K. Geol. Reichsanstalt of Vienna,—Die Gasteropoden der Meeres-Ablagerungen der ersten und zweiten Miocänen Mediteranstufe in der österreichisch-ungarischen Monarchie. I Conus, by R. Hörnes and M. Auinger.

4. From T. E. Henry, Esq.,—Aeneidea or Critical, Exegetical and Aesthetical Remarks on the Aeneis, Vol. II, by J. Henry.

5. From Col. J. F. Tennant,—Researches on the motion of the Moon, —Part I, by Professor Simon Newcomb.

The following gentleman, duly proposed and seconded at the last Meeting, was ballotted for and elected an Ordinary Member—

G. S. Leonard, Esq.

The following are candidates for ballot at the next meeting—

1. Fred. E. Pargiter, Esq., B. A., C. S., proposed by H. Beverley, Esq., seconded by J. Crawford, Esq.

2. Bábu Govinda Kumara Chaudhuri (re-election), proposed by Babu Pratápa Ch. Ghosha; seconded by Dr. Rájendralála Mitra.
3. Lieut. W. H. Johnstone, R. E., proposed by Col. J. F. Tennant, seconded by Major J. Waterhouse.
4. H. Kisch, Esq., C. S., proposed by J. Crawford, Esq., seconded by Major J. Waterhouse.
5. J. W. Parry, Esq., proposed by Carr-Stephen, Esq., seconded by Major J. Waterhouse.

The SECRETARY reported that Major W. R. M. Holroyd had intimated his desire to withdraw from the Society.

The COUNCIL reported that they had elected Mr. H. B. Medlicott, M. A., F. R. S., President of the Society in place of Mr. W. T. Blanford, Messrs. C. H. Tawney and J. Westland, Vice-Presidents in place of Messrs. Isaac and Medlicott, and Mr. J. Crawford, Member of Council in place of Dr. J. Anderson who was about to leave for Europe. Mr. Crawford would also act as General Secretary on the departure of Major Waterhouse.

Mr. MEDLICOTT said he had a few words to say upon the announcement that had just been made from the proceedings of the Council; first, to express the regret of the Council and, he had no doubt, of the Society at large, at losing the services of Major Waterhouse, who has for seven years and a half so efficiently fulfilled the duties of Honorary Secretary. At the same time the Society was to be congratulated upon securing so competent a successor as Mr. Crawford.

Next as to the nomination of himself as President, owing to the resignation of Mr. William Blanford on the occasion of his leaving India: as his successor he felt how unfit he was to undertake the duties of spokesman. He could only accept the post with a claim upon the indulgence of the Society, and because more suitable men had declined to be brought forward.

Furthermore, he had the honor to propose to the members who were present to pass a vote of thanks on the part of the Society to Major Waterhouse on his retiring from the office of Honorary Secretary.

MAJOR WATERHOUSE said, he begged to thank the members present for the vote they had just passed. He was afraid he had not done so much for the Society as he could have wished, but he had tried to do as much as he could in the limited time at his disposal. The work had been a great pleasure to him and, though he feared he would be unable to take the Honorary Secretaryship again on his return from England, he should be very glad if he could be of any further use to the Society.

The SECRETARY reported that the following coins had been acquired under the Treasure Trove Act.

From the Huzur Deputy Collector of Shikarpúr,—One Bakhri Rupee found buried in a Muhammadan cemetery near Ratladera.

From the Bombay Branch Royal Asiatic Society,—(1) A silver coin from the Collector of Surat; and (2) A Gadhia Coin from the Collector of Nassick.

The SECRETARY read the following letter from C. Girdlestone, Esq., forwarding a plan of the encampment lately used at the installation of the Dalai Lama together with an extract from the Report of the Vakeel at Lhasa to the Durbar on the subject.

“In case the members of the Asiatic Society like to see it I send under separate cover the plan of the encampment lately used at the installation of the present Dalai Lama. I agree with the late Mr. Heeley (Article on Tibet, *Calcutta Review*, No. CXVII, pp. 174, 175) in considering the present incarnation as the thirteenth and not the fourteenth as Pundit Nain Singh's account would imply. (*Report of G. T. Survey for 1866-67*, p. xxiv).”

“I also send an extract from the report of the Nepalese Vakeel at Lhasa to the Durbar on the subject of the installation, and have added a note or two.”

*Programme of bringing the Potla Lama into Lhasa.*

“On the 10th\* of Sawun Sudi all officers of the Bhote (Tibetan) Government and the Bân-rás (monks) of the several Gumbas (monasteries) down to the rank of Chitúm† should pitch their tents and remain in waiting.

From the 10th,‡ until the 12th Sawun Sudi, every one must remain in his tent.

On the 12th§ of Sawun Sudi the Lama is brought into the tent and put on the gaddi, when according to precedence the Ambahs and others present Khatas|| and a *natch* is held.

On the 13th¶ of Sawun Sudi, the Lamá is conveyed from the tent to

\* 28th July, 1879.

† The exact nature of this rank is not known at Katmandu.

‡ From 28th July to 8th August, 1879.

§ 30th July, 1879.

|| A silk article of dress like a sash.

¶ 31st July, 1879.

Potla,\* the road is lined by Banras of the several Gumbas on both sides, each with an umbrella and a flag for presentation. Thus attended the Lama is conveyed from Rika† to Potla, and Chinese and Bhotia officers join in the procession.

On the 14th‡ of Sawun Sudi, the Lama is put on the gaddi. Before putting him on the *gaddi*, the Lama is made to stand before the *gaddi*, the Ambah puts the presents from the Emperor of China before him and then two papers in Chinese and another in Bhotia are read. The Lama then facing to the East kneels down and bows his head in obeisance to the Emperor of China. He, after going through these ceremonies, sits on the *gaddi*. The Chinese papers alluded to above are explained to be an order from the Emperor of China to the effect that having learnt from Tálé Lamá,§ the Chinese Ambahs and the four Kájis of Bhote, that the new Lama has identified the things left by the late deceased Lama as his own, the Emperor authorizes him to sit on his former *gaddi*. When the Lama is conveyed from Rika to Potla the road is swept, and the windows and doors of the houses are adorned with fringes and purdahs and the terraces with flags. Any man omitting to do this, is severely punished.

Dated 12th of Bhadon badi Samvat 1936 (14th August, 1879).

DR. RÁJENDRALÁLA MITRA exhibited a collection of Jain Native Paintings lately obtained from Rajputana.

Dr. Mitra said,—the collection comprised two sets of paintings, one representing the twenty-four Tirthankaras of the Jains, and the other, forty-eight Jinas or forms of Jina. Artistically they were of no value, and as regards age, he thought, they could not be much more than a hundred and fifty years old, though the seller represented that they were much older. The first set, moreover, was very monotonous. The pose, the grouping, the details of ornamentation, and the colouring, were alike in all the paintings. The principal image is a nude male, standing in a stiff posture on a lotus, and having the hands hanging by the side. Below the lotus there is a throne, and on the rim of it there is the distinctive emblem of the saint, and it is different in every case; the colour of the images also varies in some of the paintings, but the prevailing colour is yellow or golden. On each side of the image there is an attendant waving an ox-tail *chauri*. The likeness of this attendant is the same in all the paintings, so is that of a man standing with joined hands on the right side. This person is said to

\* The Palace Monastery of the Dalai Lama on the plain of Lhasa.

† Apparently the place where the present Lama was discovered.

‡ 1st August, 1879.

§ I do not recognize the appellation. The other three great incarnations are the Teshu Lama of Tibet, the Taranath Lama of Urga and the Changai Lama of Pekin.

be the king in whose reign the saint flourished. The name of the saint and that of the king are written in golden letters. As the first twenty-one or twenty-two Tīrthankaras are believed by Oriental scholars to be apocryphal, conjured up to cast a halo of antiquity on the system of religion which the last two or three disseminated, (the last alone is a historical character,) it is not to be wondered at that there should be so much sameness in their likenesses; but as the history of Jainism is a matter of considerable importance, the pictures are of interest as containing the ideas of the Jains on the subject.

The following is a descriptive list of the saints, their colours, their emblems and the names of the different kings in whose reigns they flourished.

*List of Tīrthankaras.*

No.	Name.	Colour.	Emblem.	Name of king in whose reign he flourished.
1.	Adinātha.*	Yellow.	Bull.	Bharata Chakrí.
2.	Ajitanātha.	Yellow.	Elephant.	Sagara Chakrí.
3.	Sambhavanātha.	Yellow.	Horse.	Satyavīrya.
4.	Abhinandana.	Yellow.	Monkey.	Mitrabhāva.
5.	Sumatinātha.	Yellow.	Curlew.	Mitravīrya.
6.	Padmaprabha.	Red.	Red lotus.	Yamadyúti.
7.	Supārśvanātha.	Yellow.	Svastika.	Dharmavīrya.
8.	Chandraprabha.	Lead.†	Crescent.	Dānavīrya.
9.	Pushpadanta.	White.	Crocodile.	Meghavata.
10.	S'italanātha.	Yellow.	S'rívatsa.‡	Simandha.
11.	S'reyānsanātha.	Yellow.	Rhinoceros.	Tripishṭa Vásudeva.
12.	Vasupújya.	Red.	Buffalo.	Dvipishṭa Vásudeva.
13.	Vimalanātha.	Yellow.	Boar.	Svayambhu Vásudeva.
14.	Anantanātha.	Yellow.	Ram.§	Purushottama Vásudeva.
15.	Dharmanātha.	Yellow.	Spike-headed club	Puṇḍarika Vásudeva.
16.	S'antinātha.	Yellow.	Black antelope.	Purushadatta.
17.	Kunthanātha.	Yellow.	Goat.	Kunála.
18.	Aranātha.	Yellow.	Fish.	Govinda.

\* *Alias* Rishabha.

† White according to Stevenson in the Preface to his translation of the Kalpa.

‡ Diamond ditto.

§ Falcon ditto.

|| Nandáavarta ditto.

19.	Mallinātha.	Yellow.*	Water jar.	Suluma.
20.	Muni Suvrata.	Blue.†	Tortoise.	Ajita.
21.	Taminātha.	Gold.‡	Red lotus§	Vijaya.
22.	Neminātha.	Blue.	Conch-shell.	Ugrasena.
23.	Pārsvanātha.	Copper.¶	Serpent.	Ajita.
24.	Mahāvīra.	Gold.**	Lion.	Sreṇika.

The second set is not so monotonous as the first. In it each picture has a likeness of a Jina seated cross-legged like a Buddha in meditation, with devotees seated around, and a scene of a forest, a garden, a river, wild animals, wars, or a combat in front. The figure of the Jina is not always the same, the colour varies in some cases, and in two instances there are three heads. Whether these peculiarities are intended to imply that the Jinās are different personages, or the same personage in different characters, Dr. Mitra could not make out. To each picture is attached a page of mantras in Sanskrit, and interpretations and instructions in Māgadhī for the mode of reciting them. In these each Jina has a distinctive name.

The following are the names given:—

*List of 48 Jinās.*

No.	Name.	No.	Name.
1.	Bhaktāmara.	19.	Dyutidiptimaumukha
2.	Suralokasaṅstuta.	20.	Jñānamaya.
3.	Vibudhārchitapādapīṭha.	21.	Toshitalhṛidaya.
4.	Subodhī.	22.	Satputradātā.
5.	Munindra.	23.	Paramapurusha.
6.	Mukharita-bhakta.	24.	Avyaya.
7.	Pāpakshayaṅkara.	25.	Purushottama.
8.	Arhat.	26.	Tribhuvanārtihara.
9.	Astasamastadosha.	27.	Vināśaguna.
10.	Bhuvanabhushaṇa.	28.	Aśokatarupratihārya.
11.	Animeshāvilokanīya.	29.	Siṅhāsanapratihārya.
12.	Surūpa.	30.	Chāmarapratihārya.
13.	Subhavaktra.	31.	Chhatratrayapratihārya.
14.	Śaśāṅkasubhraguṇa.	32.	Dundubhipratihārya.
15.	Manovivekaraḥita.	33.	Pushpavrishtipratihārya.
16.	Suryātisāyīmahimā.	34.	Bhāmaṇḍalapratihārya.
17.	Suryātisāyīmahimā.	35.	Divyadhvanipratihārya.
18.	Chandramukha.	36.	Padmoparadhishthitacharaṇa.

\* Blue according to Rev. Stevenson.

† Black ditto.

‡ Yellow ditto.

§ Blue lotus ditto.

|| Black ditto.

¶ Blue ditto.

\*\* Yellow ditto.



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|---|----------------------------|
| 37. Adbhutavibhúti.   | 42. Saṅgrámabbayaniváraka. |
| 38. Gajabbayaniváraka.  | 43. Yuddhabbayaniváraka.   |
| 39. Bhinnakarikumpha-galaduj-<br>valasonitáktamuktáphala-<br>bhushitabhumistha. | 44. Rishabhanáthapurusha.  |
| 40. Rishabhadeva.   | 45. Rogabbayaniváraka.     |
| 41. Sarpabbayaniváraka.   | 46. Bandhanabbayaháraka.   |
|   | 47. Ashṭabbayaniváraka.    |
|   | 48. Vṛishabha.             |

The REV. FATHER LAFONT, S. J., exhibited some of W. Crookes' High Vacuum tubes such as were produced by the inventor at the Sheffield Meeting of the British Association in August last. Two points of great interest were especially noticed: the first is that contrary to our usual views of the electric current, the flow in these high vacua evidently proceeds from the *negative* pole of the inductorium. This was prettily shown by two different electrical Radiometers: their delicately balanced vanes were set in rapid rotatory motion by the recoil caused by the matter projected from their surfaces when made the *negative* electrode of a large Rhumkorff's Coil, whereas they remained stationary when made the *positive* electrode. One of these radiometers very clearly showed the dark space of mean molecular free path mentioned in Crookes' lecture on "Radiant Matter."

The second phenomenon showing a departure from the ordinary laws of electrical manifestations, pointed out by Father Lafont, was the apparent inactivity of the positive pole. The negative pole seems totally indifferent towards it. In ordinary Geissler's tubes the luminous track finds always its way through most complicated windings, from positive to negative, in Crookes' tubes the flow of luminous matter is darted in space *straight* in front of the *negative* pole without rejoining the positive pole. This was evidenced by two tubes in one of which a little concave mirror projected a distinct *focus* on the surface of the glass in front of it, showing no tendency whatever to the positive electrode placed quite close but above the mirror.

In a second tube a distinct *shadow* was visible on the surface of the glass opposite the negative pole: the shadow being thrown by little glass-screens placed on the path of the atoms projected by the negative pole.

These and similar facts bid fair, when properly investigated, to give us a better and more intimate notion of the nature of electricity and also of the constitution of matter. Crookes himself sees in these tubes, matter in something like a fourth state, which he calls, after Faraday, the *ultra-gaseous* state. Father Lafont remarked that the well-known and somewhat puzzling phenomenon of *stratification* of light in Geissler's tubes, seems to be simply explained, by admitting that these alternations of obscure and vivid bands, are the result of the high rarefaction of the gases, permitting

the atoms to move through appreciable spaces (Crookes' *dark space*), before collision and light being produced.

THE NATURAL HISTORY SECRETARY (Mr. Wood-Mason) drew attention to a remarkably fine head of *Ovis Poli* which had that day been presented to the Indian Museum by Major Biddulph, who had just brought it down from Gilgit. The horns measured nearly 68 inches along the outer curve, that is to say, more than 4 inches more, though from the more closely wound spiral which they described they were rather less in expanse, than those of the great head of the same species presented to the National Collection by Colonel T. E. Gordon, who procured it when he took part in the Second Yarkand Mission. Mr. Wood-Mason also exhibited a head of the Suleman form (*Capra megaceros*) of the 'Markhor' (*C. Falconeri*) to show the difference between its horns and those of a fine head of the Cashmere variety (*Capra Falconeri*) exhibited by Major Biddulph.

Major BIDDULPH said,—the head to which Mr. Wood-Mason has called attention was sent in to me last year by the Chief of Hunza, in the northern part of whose territories great numbers of *Ovis Poli* are to be found. I cannot conceive that it will be easily possible to find a finer head than this, which is several inches longer than the one presented in 1875 to the British Museum by Lieut.-Colonel T. E. Gordon, as the measurements given below will show. This head, however, has not the horns quite so thick at the base, and they taper more gradually than in the British Museum head. They also measure slightly less from tip to tip. The strength of the neck muscles\* must be enormous to allow of so great a weight being easily carried, and it is doubtless owing to this weight that the *O. Poli* and other great wild Sheep that I have noticed have a very erect carriage. A tape passed across from tip to tip shows that the muzzle of the animal must project considerably beyond the straight line, so that the native legend of animals dying on account of their not being able to feed by reason of the projection of their horns, cannot be true.

	<i>O. P.</i> head presented to Ind. Mus. by Major Biddulph.	<i>O. P.</i> head in Brit. Mus. presented by Col. Gordon.	
Length of horn round curve, ..	67 3 $\frac{1}{2}$	63	N. B. One horn measures $\frac{1}{2}$ inch less than the other.
Circumference at base, .....	16	16 1 $\frac{1}{2}$	
Ditto at 1 foot, .....	15 5 $\frac{1}{2}$	15 1 $\frac{1}{2}$	
Ditto at 2 feet, .....	14 1 $\frac{1}{2}$	14 3 $\frac{1}{4}$	
Ditto at 3 feet, .....	12 3 $\frac{3}{4}$	12 3 $\frac{1}{4}$	
Ditto at 4 feet, .....	9 1 $\frac{1}{2}$	9	
From tip to tip in a straight line,	53 3 $\frac{1}{2}$	54	

\* But especially of the *ligamentum nuchae*, which mainly sustains the weight of the head.—(J. W.-M.)

The measurements of the British Museum head are taken from the Proceedings of the Zoological Society of London for 1875, p. 523.

The following papers were read:—

1. *A Collection of Hindi Roots, with remarks on their derivation and classification.*—By DR. A. F. RUDOLF HOERNLE.

(Abstract.)

This collection contains upwards of 500 roots. They are divided into two classes, Primary and Secondary. The former contains roots which are identical with Sanskrit ones, though more or less disguised by phonetic modifications. These disguises are produced by various cases; 1, by phonetic permutation; *e. g.*, *chal* or *char* "walk" = Skr. *chal*; *khá* "eat" = Skr. *khád*; *paros* "distribute" = Skr. *parivesh*;—2, by incorporation of the "class-suffix"; *e. g.*, *bújh* "know" = Skr. *budh* + *ya*; *bhanj* "break" = Skr. *bhanaj* (*bhaj*); *sun* "hear" = Skr. *śru* + *nu*; *ján* "know" = Skr. *jñá* + *ná*.—3, by incorporation of the passive suffix *ya*; *e. g.*, *lag* "belong" = Skr. *lag* + *ya*; *sích* "irrigate" = Skr. *sích-ya*;—4, by change of "class"; *e. g.*, *páca* "obtain" (VIth) = Skr. *prap-nu* (Vth); *kara* "do" (VIth) = Skr. *kar-u* (VIIIth); *jána* "know" (VIth) = Skr. *jñá* + *ná* (IXth);—5, by change of "voice"; *e. g.*, *bhaj* "break" (act.) = Skr. *bhaj-ya* "be broken" (pass.); *dē* "give" = Skr. *dīya* (*dá* + *ya*) "be given";—6, by addition of the pleonastic suffix *api*; *e. g.*, *suháv* "be pleasant" = Skr. *sukh*. Secondary roots are those, as to which there are no identical roots in Skr., though ultimately they can be traced to Skr. roots. Such roots are either 1, derivative; *e. g.*, *nah* "flow," from *nahá* "bathe" = Skr. *sná*; or 2, denominative; *e. g.*, *jam* "germinate," from Skr. noun *janma* "birth," of Skr. root *jan* "be born"; *paiṭh* "enter," from Skr. participle *pravishṭa* "entered," of Skr. root *praviṣ* "enter"; or 3, compound; *e. g.*, *chuk* "cease," from Skr. *chyt* + *kr*, of Skr. noun *chyt* "flowing away" and Skr. root *kr* "make"; *rok* "hinder, stop," from Skr. *rut* + *kr*, of Skr. noun *rudh* "hindering" and root *kr*; *kasak* "pain," from Skr. *kasha* + *kr*. There remain a small number of roots, which it is not possible at present to bring under either of the two classes; *e. g.*, *dho* "carry."

DR. RÁJENDRALÁLA MITRA thought the paper laid on the table was worthy of special note. It treated of a subject of great importance in connexion with the philology of the Indian vernaculars, and, knowing how ably its learned author had discussed the comparative grammar of the Sanskritic dialects in his papers on the so-called Gaudian languages published in the Society's Journal, Dr. Mitra had no doubt that the contribution now

received would prove equally interesting. He had no opportunity of reading the paper, and was not aware of the exact direction it had taken; but its title appeared to him misleading. It suggested to him the previous question, was there such a thing as a Hindi root distinct from Sanskrit roots? Of course there were in Hindi, as in other vernaculars, a great many nominal roots formed from nouns, in the same way in which in English the noun cane produced caning; but he did not refer to them. By roots he meant radicals of verbs originally implying action, and not names of things. In this sense he believed there were no Hindi roots as distinct from Sanskrit roots, or in other words, the roots of the Hindi, as of all other Aryan dialects of India, were derived from the Sanskrit. Even as the Sanskrit nouns and other vocables had, under climatic and other influences, gradually undergone wear and tear in different ways till they resulted in the vernaculars, so had the roots; and the transition was entirely governed by the laws of phonetic decay and dialectic regeneration. For instance the Vedic *ḍhu* 'to be,' changed to *ho* in the Hindi,—the change commenced at a very early age and is still traceable, though rarely, in some Vedic and other ancient writings—so did all the other roots which were required for the derivative dialects. In the course of his reading Dr. Mitra had not found a single Hindi root which could not be shown to be a decayed or regenerated Sanskrit radical, and he believed that an enquiry into Hindi roots for philological purposes must necessarily be the same as an enquiry into the decay and regeneration of the phonetic elements of a language. Whether this was the line of Dr. Hoernle's enquiry or not he was not aware, but he thought it well to point out the misleading character of the title.

Dr. Hoernle explained that Dr. Mitra's remarks were founded on a misapprehension of the scope of his paper, the points of view in which did not materially differ from those expressed by Dr. Mitra. He understood by roots the constant element in any series of sense-related words; thus in the Hindi words *bolí* "speech," *bolat* "speaking," *bolai* "he speaks," *bolávaṭ* or *bolává* "calling," *bol* is the constant element or root. Hindi, like every other language, had such roots. The object of the paper was to collect these Hindi roots, to discuss the various ways of their derivation from Sanskrit or elsewhere, and to classify them accordingly.

## 2. *On the occurrence of the Musk Deer in Tibet.*—By

R. LYDEKKER, B. A.

This note will be published in Journal, Part II, No. 4, for 1879.

The following communication has been received:—

Coins of the Sunga or Mitra Dynasty found at Ramnagar or Ahichhatra. By A. CARLMEYLE. Communicated by H. RIVETT-CARNAC, Esq., C. S., C. I. E.

## LIBRARY.

The following additions have been made to the Library since the Meeting held in November last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,  
presented by the respective Societies and Editors.

Bombay. Indian Antiquary,—Vol. VIII, No. 99, November 1879.

*Fleet, J. F.*—Sanskrit and old Canarese Inscriptions, No. 60. *Pope, Rev. G. U.*—Notes on the Kural of the Tamil Poet Tiruvalluvar. *Logan, W.*—Find of Ancient Pottery in Malabar. The six Tirtaka. *Hartshorne, B. F.*—The Weddas.

Bordeaux. Société de Géographie commerciale,—Bulletin, No. 21, 3rd November, 1879.

*Sourbé.*—Journal des coups de vent à l'île Maurice de 1812 à 1848.

Calcutta. Indian Meteorological Memoirs, Vol. I, Part 3.

———. Ramayana,—Nos. 11 and 12.

Dublin. Royal Irish Academy, Polite Literature and Antiquities,—Proceedings, Vol. I, Ser. II, No. 13.

*Ball, F.*—On the Forms and Geographical Distribution of Ancient Stone Implements in India.

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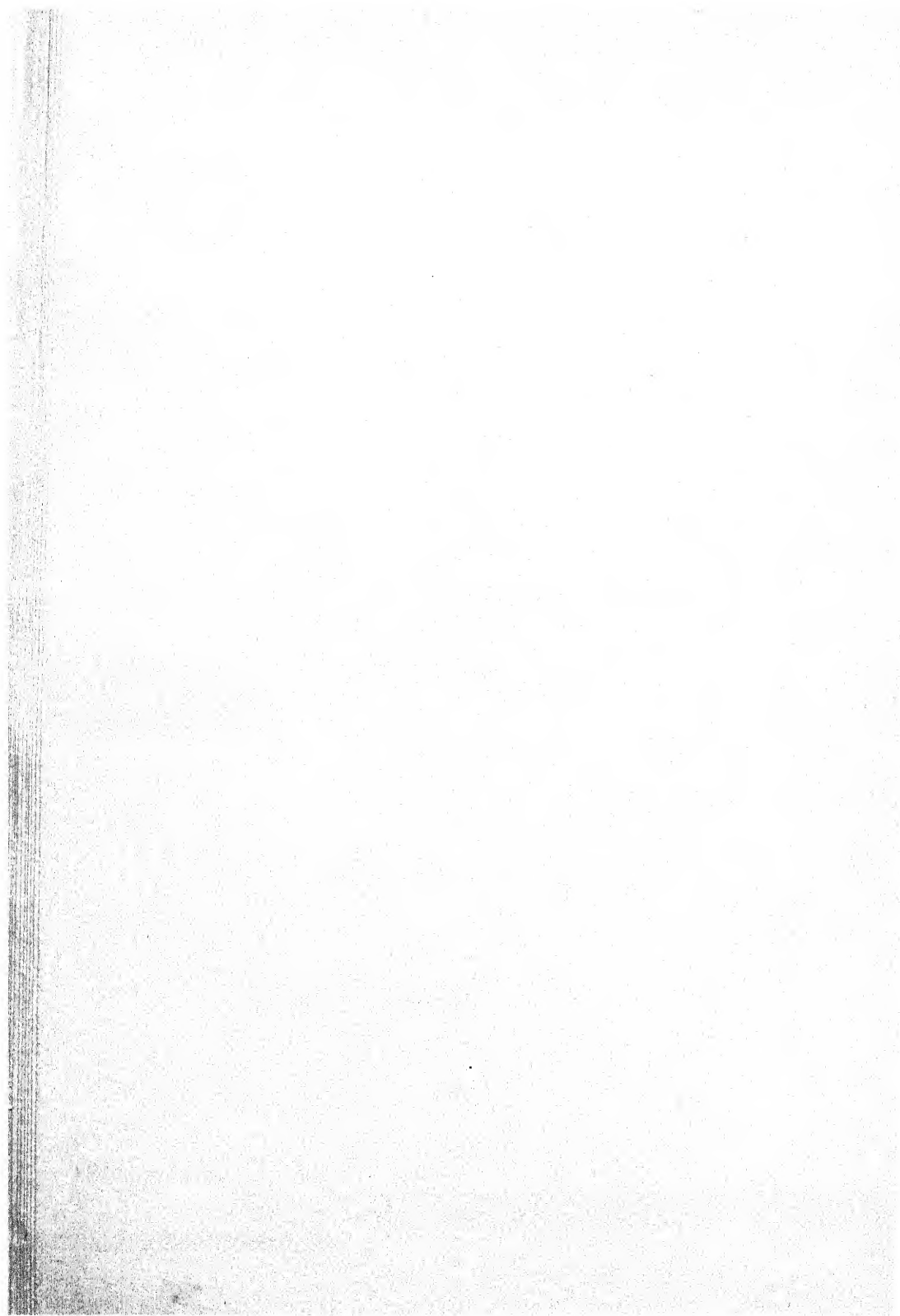
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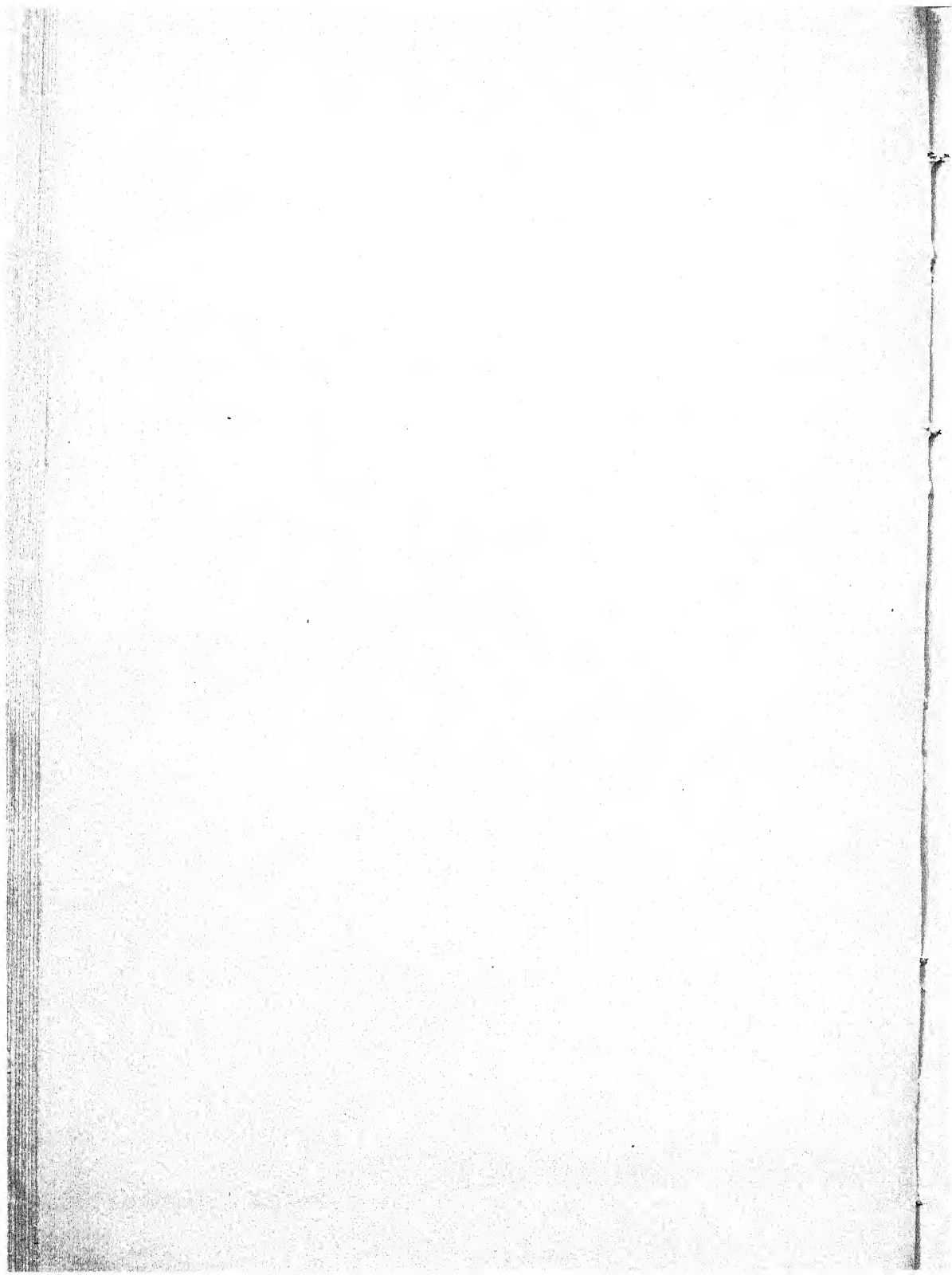
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